U.S. PERSONAL COMPUTER SOFTWARE MARKETS

1984 - 1989

INPUT

About INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions. Continuing services are provided to users and vendors of computers, communications, and office products and services.

The company carries out continuous and in-depth research. Working closely with clients on important issues, INPUT's staff members analyze and interpret the research data, then develop recommendations and innovative ideas to meet clients' needs.

Clients receive reports, presentations, access to data on which analyses are based, and continuous consulting.

Many of INPUT's professional staff members have nearly 20 years' experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed in 1974, INPUT has become a leading international planning services firm. Clients include over 100 of the world's largest and most technically advanced companies.

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Planning Services For Management

U.S. PERSONAL COMPUTER SOFTWARE MARKETS, 1984-1989

U.S. PERSONAL COMPUTER SOFTWARE MARKETS, 1984-1989

CONTENTS

EXHIBITS

1 INTRODUCTION

I INTRODUCTION

- This report is produced as one of a series of reports in INPUT's Personal Computer Markets Program which is part of the Market Analysis and Planning Service (MAPS).

- INPUT conducts ongoing research into the information services industry, studying a variety of issues and trends affecting the industry participants.

A. PURPOSE OF THIS REPORT

- The personal computer software industry was born less than ten years ago. Annual user expenditures for business-related micro computer software in 1984 are $1.6 billion. By 1989 those expenditures will approach the $10.5 billion mark, a 45% annual average growth rate (AAGR).

- Accelerated growth and, by now, a respectable size within the U.S. industrial environment, have brought much needed definition and partial maturity to specific segments of this industry.

- On the other hand, also present are poorly defined market boundaries, fast changing products and an endemic lack of the proper capitalization necessary for obtaining lasting shelf space and brand name recognition.

- The users of personal computer software have experienced a few woes of their own. Vendors' hard-to-keep promises, ill-prepared sales forces, unclear documentation, spotty support and confused training have been lavished upon a large portion of the user community.

- This report presents, reviews, and analyzes the major components of the personal computer software industry in the context of the above issues. A comprehensive description of the current status of the market along with a five-year forecast defining potential size and growth will provide readers with a solid data base that can be used to identify and assess opportunities and challenges within this exciting, but volatile aspect of the information services industry.

- Specific areas of high and low growth, and high and low risk are also highlighted. Where appropriate, specific recommendations related to business strategy are presented.

- This report is designed to assist vendors in:

  - Identifying new markets and product opportunities.

  - Assessing product and marketing risk exposure.

  - Allocating R&D and operation resources.

  - Obtaining insights into market-related developments that impact bottom-line profitability.

B. SCOPE AND ORGANIZATION

- The terms microcomputer, micro, personal computer, and PC are used interchangeably in this report.

- This report is organized as follows:

  - Chapter II is an Executive Summary provided in a presentation format complete with script.

  - Chapter III examines key issues related to industry structure, product strategy opportunities and challenges, and customer support. Also included is a discussion of PC hardware configuration trends.

  - Chapter IV provides market analyses and forecasts of over 30 different micro software segments. Also included is a discussion of PC hardware installed-base trends for the next five years. Industry-specific markets surveyed in this chapter include:

    . Banking and finance.

    . Discrete manufacturing.

    . Distribution (retail and wholesale).

    . Education.

    . Insurance.

    . Medical.

    . Process manufacturing.

- . Services.
- . Transportation.
- . Utilities.

- The following cross-industry application software markets are surveyed:
  - . Application software.
  - . Accounting.
  - . Education and training.
  - . Engineering and scientific.
  - . Human resources.
  - . Planning and analysis.

- System software markets discussed in this chapter are:
  - . Application development tools.
  - . Data center management.
  - . System control.

- Appendix A contains definitions of terms and concepts related to topics in this report.

- Appendix B contains a data base of statistical market forecasts from which the textual references and exhibits are drawn.

- Appendix C lists other INPUT reports related to personal computer market directions and trends.

- Exhibit I-1 profiles the software market structure in more detail.

- The PC software industry analysis and forecasts developed by INPUT for this report are for U.S. user expenditures for noncaptive business (i.e., business derived from a firm's parent or affiliated organization is excluded). Forecasts for home- and entertainment-related software for personal use are excluded.

- The process of forecasting is a continuous one. This year's report represents the eighth year INPUT has studied the software industry. Two fundamental and complementary approaches are used to analyze the industry.

- The first approach requires a constant interface, through formal and informal interviews and contacts, with buyers of PC software in each of the industries surveyed.

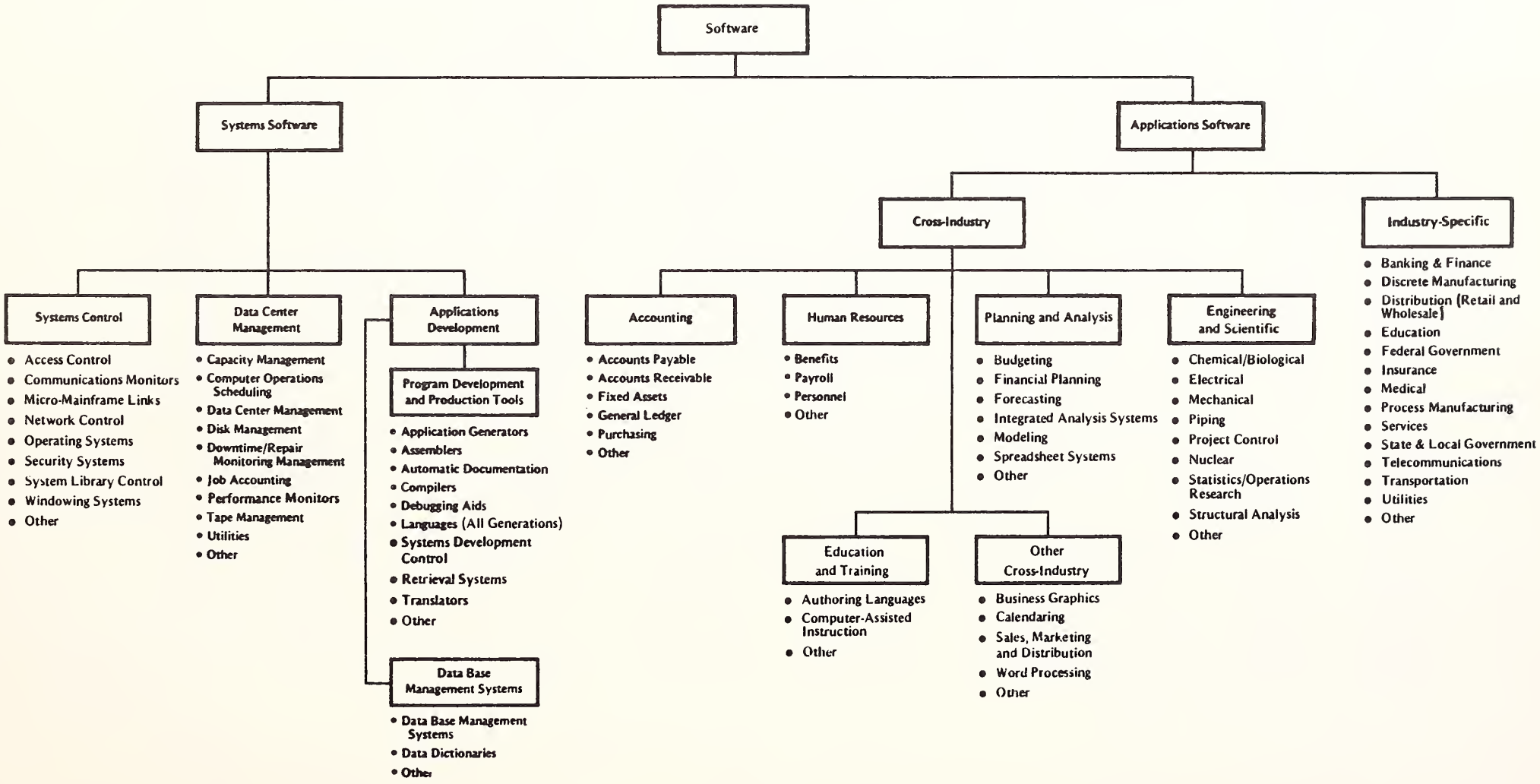
- The second approach requires an on-going monitoring of all PC software vendors with annual revenues greater than $10 million. Stratified random sampling techniques are employed to estimate the size and change in that portion of the industry represented by smaller firms.

- At the convergence of these two processes, INPUT researchers analyze industry size, composition, change, direction, etc., to generate the forecasts included in this report.

- All forecast numbers presented are in current dollars (i.e., 1989 market size are in 1989 dollars). Inflation is assumed to be an annual 6% for the same period.

EXHIBIT I-1

SOFTWARE MARKET STRUCTURE



- INPUT always welcomes comments, inquiries and suggestions relating to report contents and structure.

II EXECUTIVE SUMMARY

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- This chapter summarizes key forecasts, issues, and trends which are discussed in more detail in the remainder of the report.

- This Executive Summary is prepared in a presentation format; i.e., the exhibits are set in larger type for ease of use with an overhead projector and the text is in script form. The script for each exhibit is contained on the left hand page opposite the exhibit.

A. A HEALTHY OUTLOOK FORESEEN FOR MICROCOMPUTER SOFTWARE

- The market for business-related microcomputer software products in the U.S. will be strong throughout the balance of the 80s. User expenditures will total $1.6 billion in 1984 and then increase 45% annually to become a $10.5 market by 1989. During this period the micro software share of the total software products market will increase from 15% in 1984 to 26% by 1989. In spite of disappointments experienced by many micro software vendors in 1984, several fundamental forces will keep the industry strong for the next five years. These factors include:

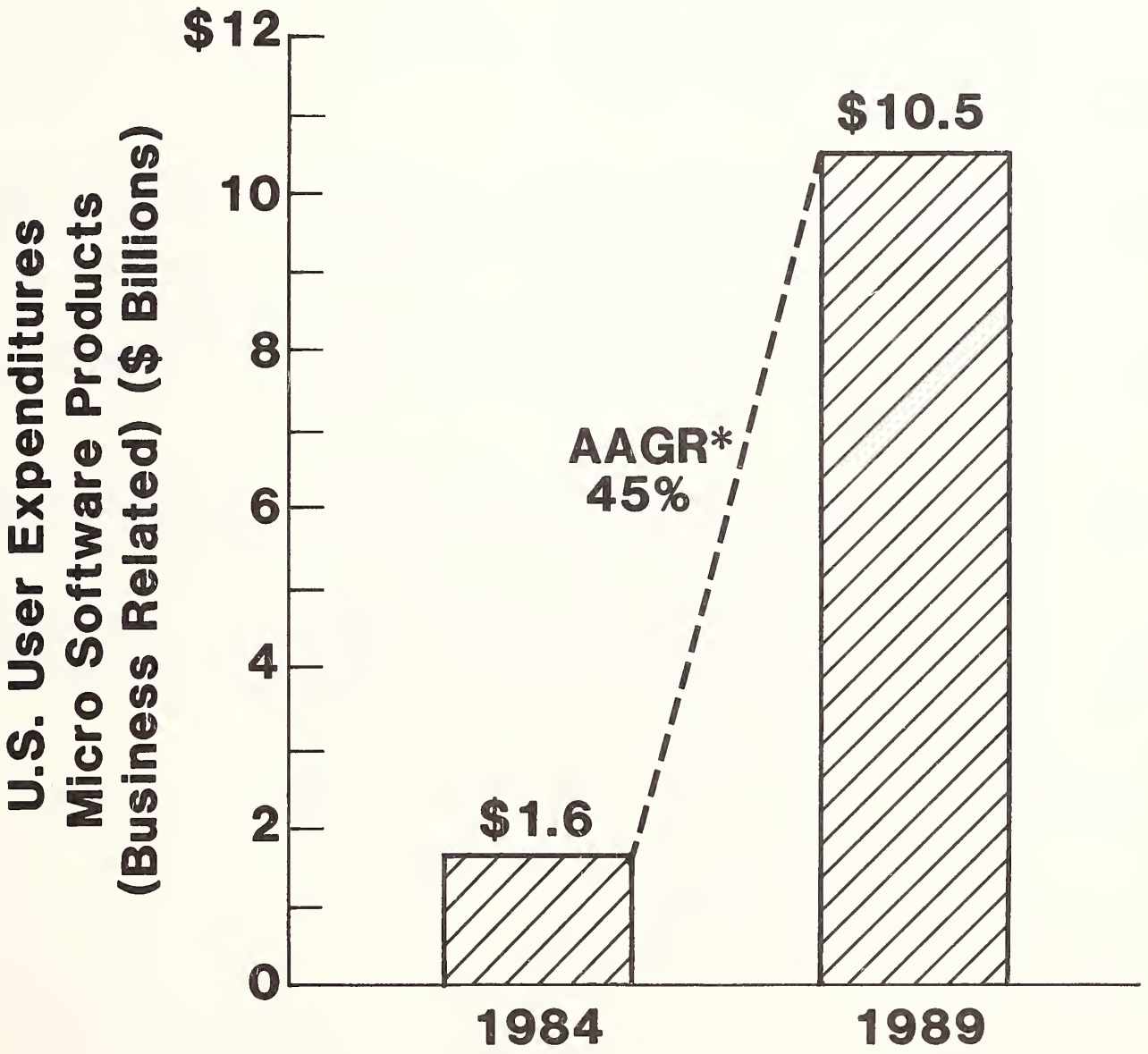
  - A sixfold increase in the microcomputer hardware installed base. From 3.6 million units installed in 1983, the micro population will grow to 23.5 million by 1989. An estimated average price decrease of 20% per year (for the same functions) will bring affordable computer power to millions of new users.

  - Use of information systems as competitive weapons. Realization of this opportunity by corporation management will boost demand for micro-mainframe links and other end-user-oriented solutions that require expanded software capabilities for micros.

  - The upward mobility of computer-trained people. There are millions more computer-literate people today than existed three years ago. As they assume more organizational responsibility they will demand more end-user systems.

EXHIBIT II-1

A HEALTHY OUTLOOK FORESEEN FOR MICROCOMPUTER SOFTWARE



*Average Annual Growth Rate

B. ALL THREE MICRO SOFTWARE COMPONENTS TO DO WELL

- The micro software market will show strong growth across all three of its major components for the next five years.

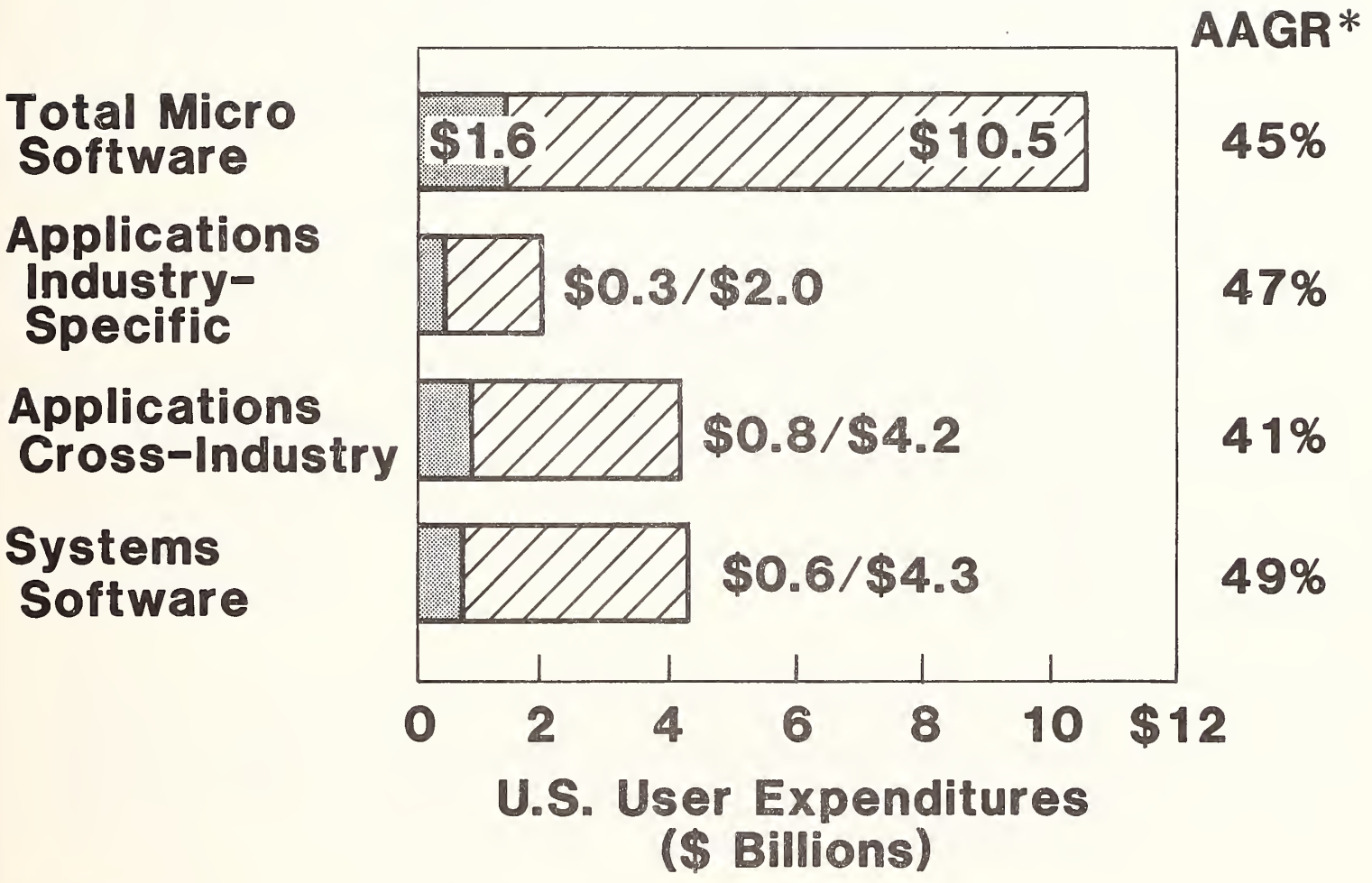
- From today's small base of $300 million, industry-specific applications software will grow an impressive 47% annually to reach $2 billion by 1989. Emphasis on information systems as competitive weapons will greatly stimulate this market area as businesses utilize micros to support their unique way of operating.

- Cross-industry applications software, currently the largest component at $800 million, will grow 41% yearly to become a $4.2 billion market by 1989. The increased complexity of the business environment combined with easy user access to over 23 million micros by 1989 will drive this market upward at a rapid pace.

- Systems software products will be both the largest component by 1989 and the fastest growing. A 49% annual growth rate will propel this market from a 1984 of $600 million to a 1989 level of $4.3 billion. Key factors in this market's growth include end-user enthusiasm toward easy-to-use applications development tools and the expanded use of data base management systems (DBMS) for data, text, and image-processing applications.

EXHIBIT II-2

ALL THREE MICRO SOFTWARE COMPONENTS TO DO WELL



*Average Annual Growth Rate

C. PLANNING/ANALYSIS AND ACCOUNTING TO LEAD CROSS-INDUSTRY SOFTWARE GROWTH

- Packages dealing with management planning and control dominate the micro software cross-industry applications software market.

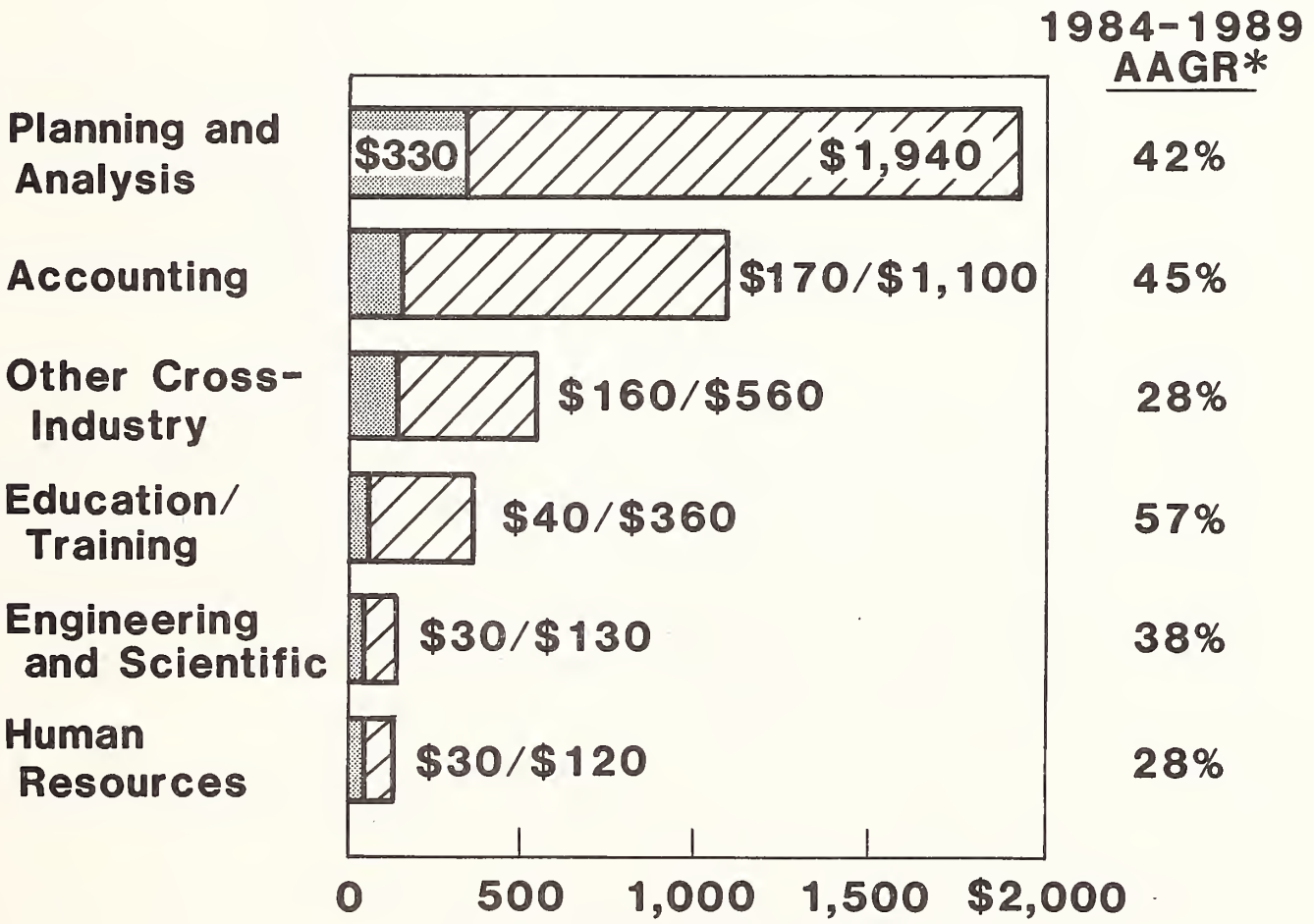
- The planning and analysis segment, which includes systems dealing with such applications as budgeting, modeling, and spreadsheet, as well as integrated analysis systems (e.g., Lotus's Symphony and Ashton-Tate's Framework) will remain the largest segment with a 1984 base of $330 million growing to $1.9 billion in 1989. These broad-based applications address major needs of management and professional workers who comprise over two-thirds of the cost of a typical office.

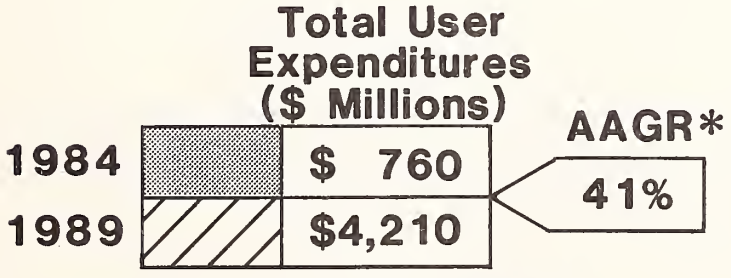
- Accounting systems, although only about one-half the size of the planning and analysis segment, are nevertheless responsible for over 20% of the entire cross-industry applications marketplace. Accounting software will grow faster (45% annually) than any other cross-industry applications segment, except for education and training. The availability of more powerful micro hardware will encourage many businesses to use them for one of the most important, time consuming, and fundamental of all business operations--accounting.

- As shown on the exhibit, a wide variance in market growth and size exists between the various cross-industry segments. Every one, however, is growing faster than the 22% annual increase forecast for the overall information services industry.

EXHIBIT II-3

PLANNING/ANALYSIS AND ACCOUNTING TO LEAD CROSS-INDUSTRY SOFTWARE GROWTH





* Average Annual Growth Rate

Note: All Dollars Rounded to Nearest $10 Million

D. MULTIPLE HIGH-GROWTH OPPORTUNITIES EXIST WITHIN INDUSTRY-SPECIFIC MARKETS

- Micro software products for industry-specific applications will increase almost sevenfold during the next five years. By 1989 its share of the total micro software market will be 19%.

- Industry-specific markets tend, on the average, to be smaller than the cross-industry segments mentioned earlier. For example, banking and finance, the largest of the industry-specific segments, is approximately two-thirds smaller than the largest cross-industry segment (planning and analysis), and is about one-half the size of the second largest cross-industry segment (accounting).

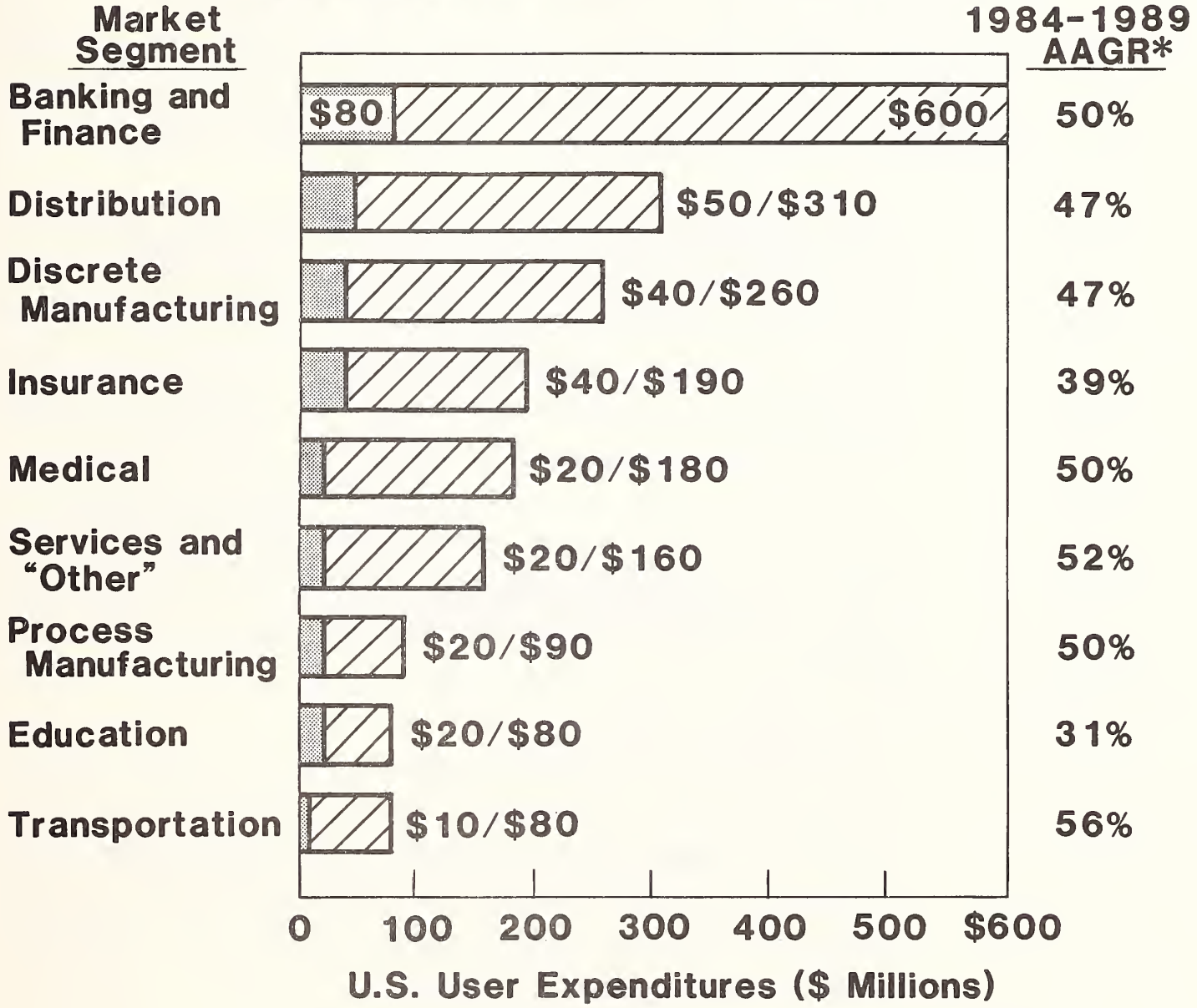
- However, when the top six fastest growth rate segments are identified, industry-specific segments outperform cross-industry segments by occupying five of the six top entries. Education and training (cross-industry) takes the top spot with 57% annual growth (see Exhibit II-3), with the next five segments being all industry-specific: transportation (56%), services and "other" industry-specific (56%), medical (50%), process manufacturing (50%), and banking/finance (50%).

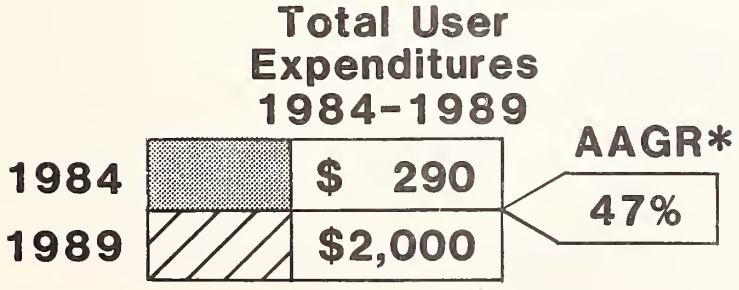
- Industry-specific microcomputer software will have high appeal because:

  - Once users become comfortable with the common cross-industry applications (word processing, spreadsheets, etc.), they will seek applications that have a higher potential payoff; i.e., those industry-specific applications that increase the productivity of the heart of their operations.

  - Vendors can enjoy higher prices and higher barriers to competitive entry as a result of their becoming skilled in the industry-unique aspects of their customer's business.

MULTIPLE HIGH-GROWTH OPPORTUNITIES EXIST WITHIN INDUSTRY-SPECIFIC MARKETS





* Average Annual Growth Rate

Note: All Dollars Rounded to Nearest $10 Million

E. INFORMATION SYSTEMS DEPARTMENTS TO EXERT MORE BUYING INFLUENCE

- Information systems (IS) executives feel that end-user computing is the "most significant change" affecting their department. They are responding to this challenge in a variety of ways.

  - Organizational entities with "end-user computing" responsibility are being established. These information systems department-controlled organizations encompass those major activities that deal with end-user resource and support. This approach enables the IS group to exert significantly more influence on microcomputer hardware and acquisitions during the coming years.

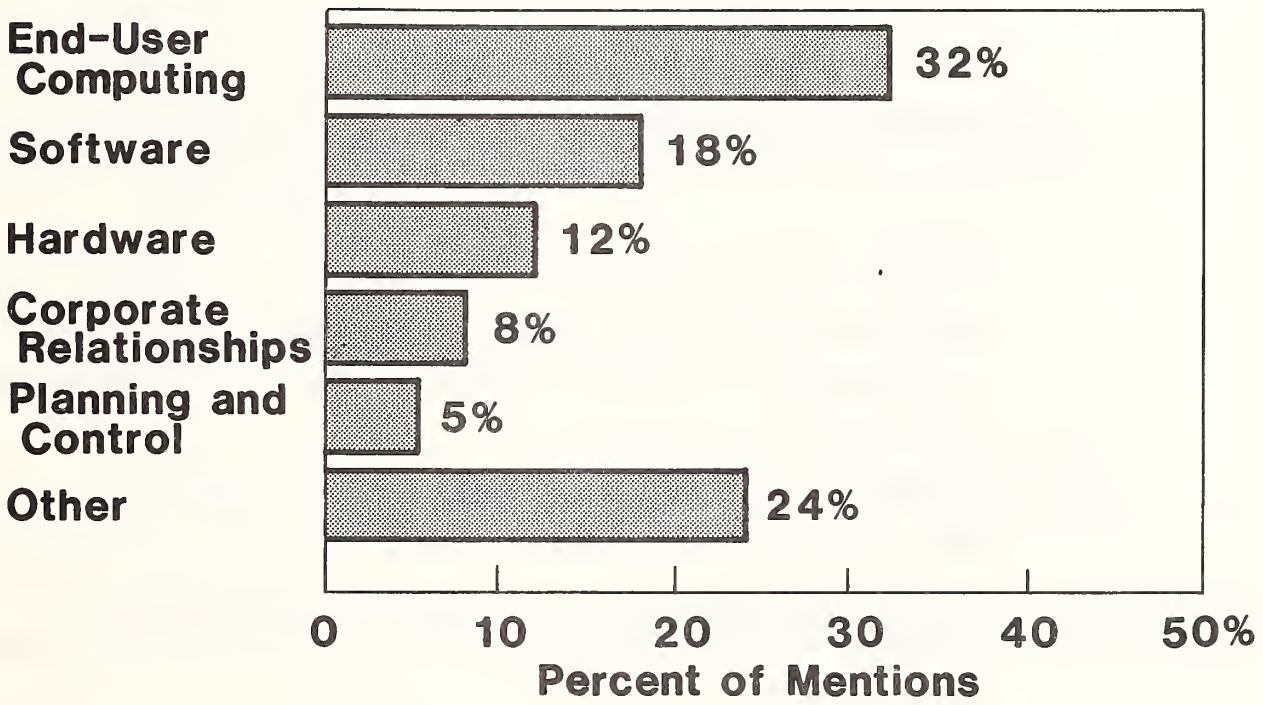
  - More attention is being given to software integration. Buyers expect vendors to have solutions that provide effective links to related systems regardless of whether they are externally or internally developed.

  - More emphasis will be placed on getting systems up and running as quickly as possible. This year's INPUT survey of information systems executives showed software as their number one objective. Micro software vendors must maintain closer dialogs with these information systems/end-user decision makers to ascertain how their offerings can best fulfill these urgent software needs.

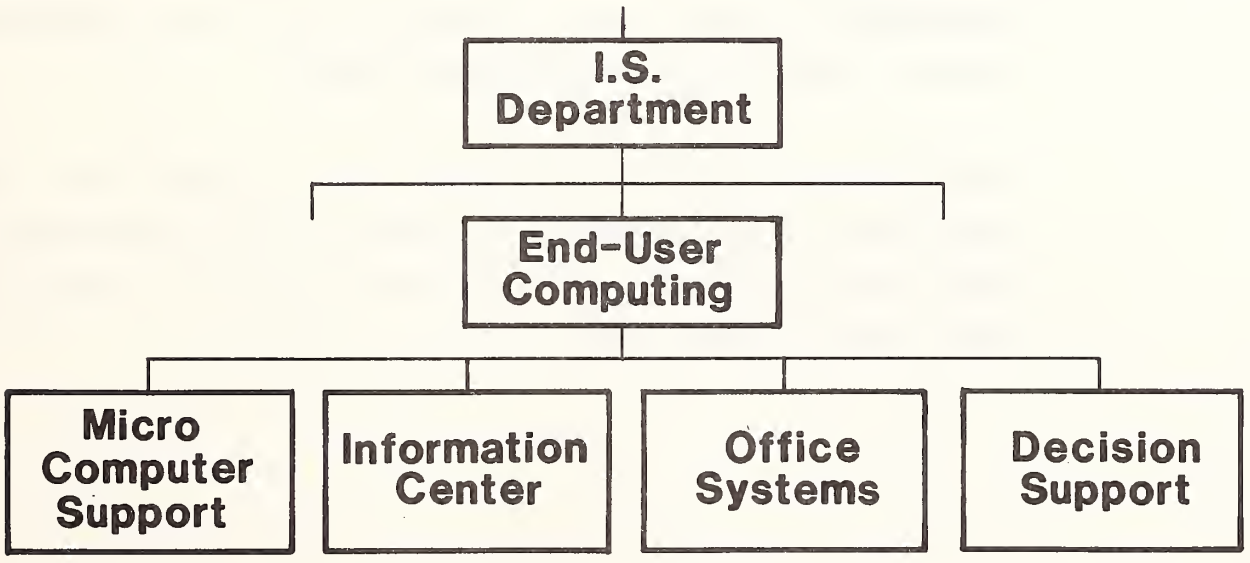
EXHIBIT II-5

INFORMATION SYSTEMS DEPARTMENTS TO EXERT MORE BUYING INFLUENCE

• Most Significant Changes Affecting I.S.



• Organizational Response



F. RECOMMENDATIONS

- For vendors desiring an increased penetration in the micro software products marketplace, the following recommendations are provided:

  - View target markets globally. Narrow your market focus but broaden your product scope. Identify new functionality that builds on the base of your existing product/market expertise. For example, word processing products can be broadened to become idea processing systems with outlining, free form text, and DBMS storage/manipulation capabilities.

  - Develop products that link to the changing environment. Support micro-mainframe links, related systems (either vendor-supplied or user-developed), and other aspects of today's increasingly interconnected world.

  - Support your local IS managers. Understand their unique perspective. Develop product and marketing strategies that recognize their view of the world. Expand support services in the areas of training, documentation, and hotline.

  - Assess new distribution channel opportunities. Mainframe software, processing turnkey systems and processing services vendors are good candidates, as is IBM, and also numerous trade and group associations that have "reach" into widely dispersed markets.

  - Gird business and marketing strategies for a tougher battle. While opportunities abound, intensified competition and shorter product life cycles demand sharper marketing, stronger financial strategies and a better defined market focus.

EXHIBIT II-6

RECOMMENDATIONS

- Narrow Market Focus, But Broaden Product Scope
- Link Products
- Support Your Local I.S. Managers
- Assess New Distribution Opportunities
- Opportunities Abound, But Gird Strategies for a Tougher Battle

III ISSUES, TRENDS, AND DEVELOPMENTS

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A. INDUSTRY STRUCTURE AND PERCEPTIONS

- The entire information services marketplace will undergo a significant restructuring during the next five years. Micro software vendors, as increasingly important participants, must be alert to these changes in order to obtain lead time for developing successful responses.

- Exhibit III-1 shows that while independent information services vendors will still maintain the lion's share of user expenditures, two new categories of firms will dramatically increase their piece of the market pie.

  - Computer/communications hardware vendors (IBM, AT&T, HP, Wang et al.) will increase their share from 10% to 16%. It was by no accident that IBM's heavily promoted theme at the fall 1984 COMDEX show was "when you think software . . . think IBM."

  - Vendors who are subsidiaries of larger firms will almost double their share from 10% to 19%. While many parent organizations will fail to make their ventures profitable because of underestimation of the unique management challenges inherent in this marketplace, their market presence will be noticeable due to their financial resources, distribution assets and brand name recognition.

EXHIBIT III-1

INFORMATION SERVICES
MARKET STRUCTURE: 1983-1989

TYPE FIRM	SHARE OF MARKET	
	1983	1989
Independents	69%	59%
Computer/ Communications Hardware	10	16
Subsidiaries	10	19
Other	11	6
Total	100%	100%

- Vendor size is an especially important issue when viewing the environment of the next five years.

  - The vagaries of the marketplace can appear suddenly and with severe impact. Successful vendors must be able to weather these market swings.

  - Significant research and development funds are essential in order to stay abreast with technology and competition.

- Information services vendors of all types are becoming increasingly active in micro arenas. INPUT's survey of over 500 information services vendors during mid-1984 revealed that over 27% of these vendors had microcomputer-related revenue.

- In light of the above developments, it is instructive to take a closer look at the size and perceptions of independent vendors who offer micro software as their main business activity.

  - Exhibit III-2 shows that among the top 50 independent software products vendors, micro software firms comprise 18% of these organizations.

  - Within the top ten vendors, micro firms occupy an impressive 36% of the positions.

- The outlook of micro software firms in terms of their perceived opportunities and threats is shown in Exhibits III-3 and III-4.

  - Vendors see opportunities evolving around new products and new marketing strategies. They are also optimistic about the environment in which they compete in spite of its challenges.

EXHIBIT III-2

INDEPENDENT MICRO SOFTWARE VENDOR RANKINGS
(Versus All Independent Software Product Vendors)

VENDOR	TOP 50 RANK*
Lotus Development Corporation	6
Microsoft Corporation	7
Micropro International	10 (tie)
Digital Research, Inc.	10 (tie)
VisiCorp[1]	13
Sorcim [2]	15
Ashton-Tate	21
Software Publishing Corporation	41
Software Arts	50

* Based on 1983 Calendar Year U.S. Noncaptive Revenues
1 = Now a part of Paladin Corporation
2 = Now a part of Computer Associates

EXHIBIT III-3

OPPORTUNITIES ENVISIONED BY
MICROCOMPUTER COMPANIES

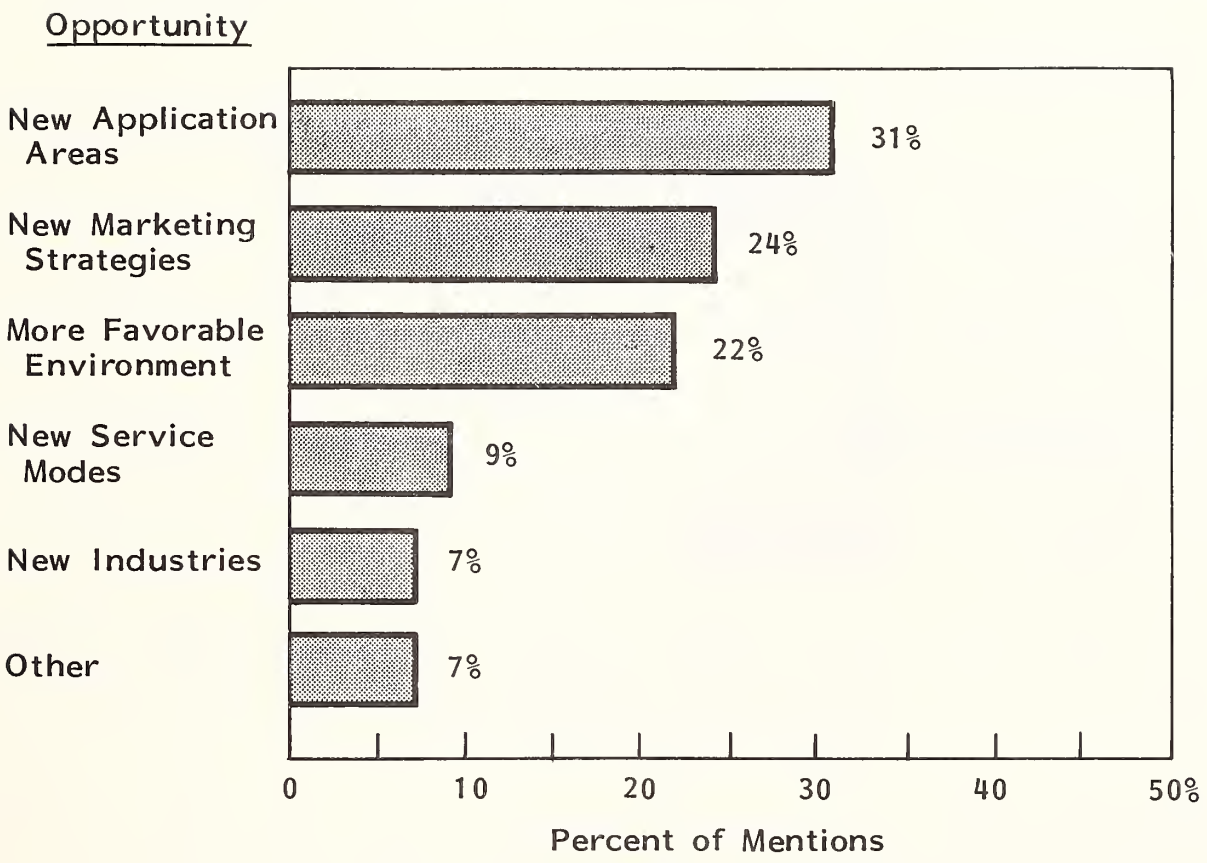
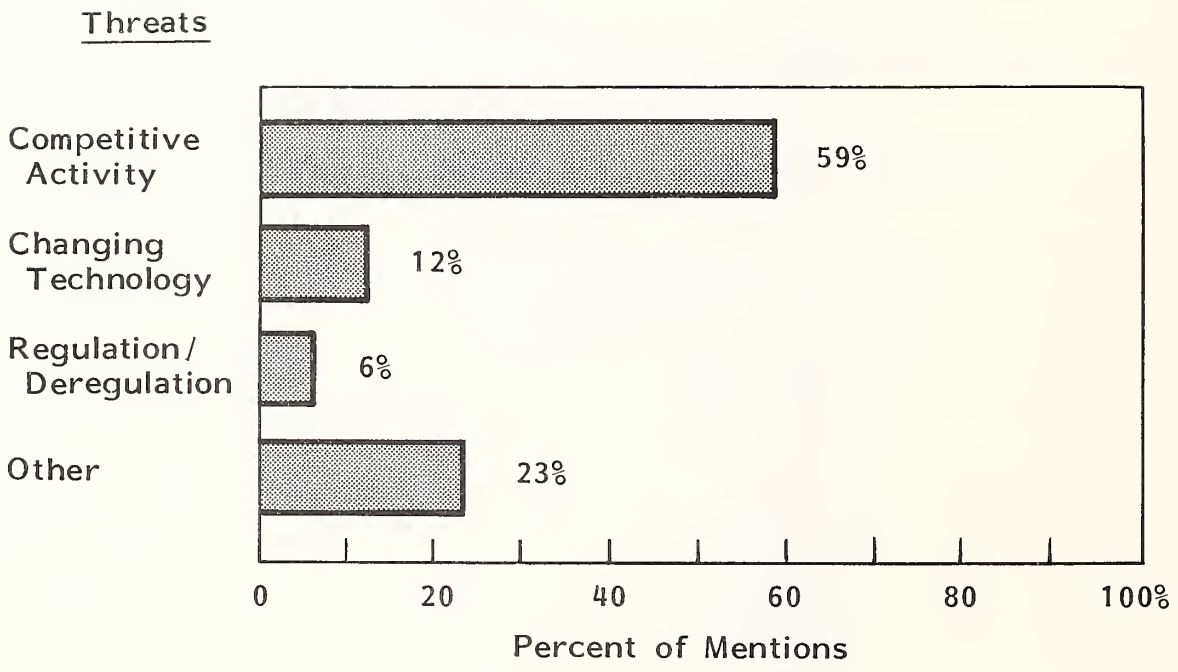


EXHIBIT III-4

THREATS IDENTIFIED BY
MICROCOMPUTER SERVICES COMPANIES



- Competition is seen as the primary "threat." The small-scale startups of the past will be giving way to the large hardware and/or software vendors (including the mammoth communications and publishing companies) as the key competitive threat.

- INPUT generally concurs with these vendor observations. However, there exist many situations where vendors are underestimating the magnitude of the changes required to be successful, especially in the areas of cost-effective distribution and product enhancement and support.

B. APPLICATIONS CONSIDERATIONS

1. MICRO-MAINFRAME

- Micro-mainframe will become an increasingly popular environment during the next five years. Micro software vendors must be alert to its evolving characteristics and implications in order to develop market strategies that are effective.

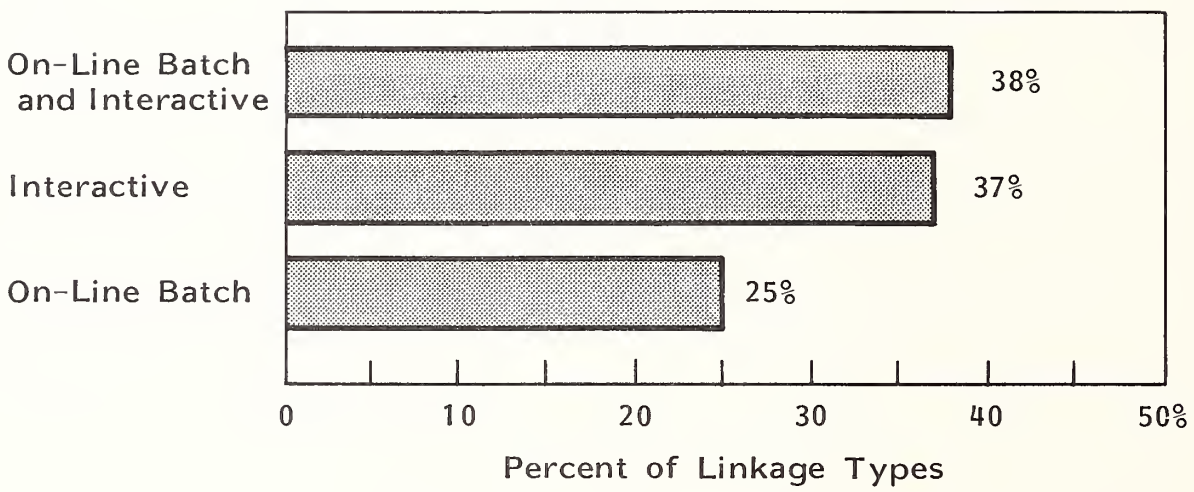
- INPUT's findings reveal that close to one-third of all software applications by 1989 will have some type of micro-mainframe capability.

- The linkages desired are varied and complex. As shown in Exhibit III-5, over two-thirds of users want ties involving some degree of interactive facility. The on-line batch approach (periodic mainframe downloading to a micro which can then be used interactively) is tolerable but less desirable than a fully interactive service.

- Fortunately, users are very attuned to using vendors to assist them with micro-mainframe development and installation challenges. INPUT's survey revealed that no less than 69% of the respondents are actively relying upon vendors to make micro-mainframe a reality.

EXHIBIT III-5

TYPES OF MICRO-MAINFRAME LINKAGES
FORESEEN BY CORPORATIONS



- Exhibit III-6 shows that micro software vendors rate at the top of the list in terms of assistance expected. Thus micro vendors can expect a receptive user attitude toward micro-mainframe products and services.

2. NEW APPLICATION CATEGORIES

- It is important for micro software vendors to understand how traditional application limits can disappear and new application opportunities can emerge in the fast moving world of PCs. The "intimate" and highly interactive environment of the microcomputer is giving rise to the creation of several new software application categories.

- Three of the new application categories that are emerging deal with productivity tools for knowledge workers. These categories are:

  - Thought processors (as opposed to word processors).

  - Business psychology support tools.

  - Management activation systems.

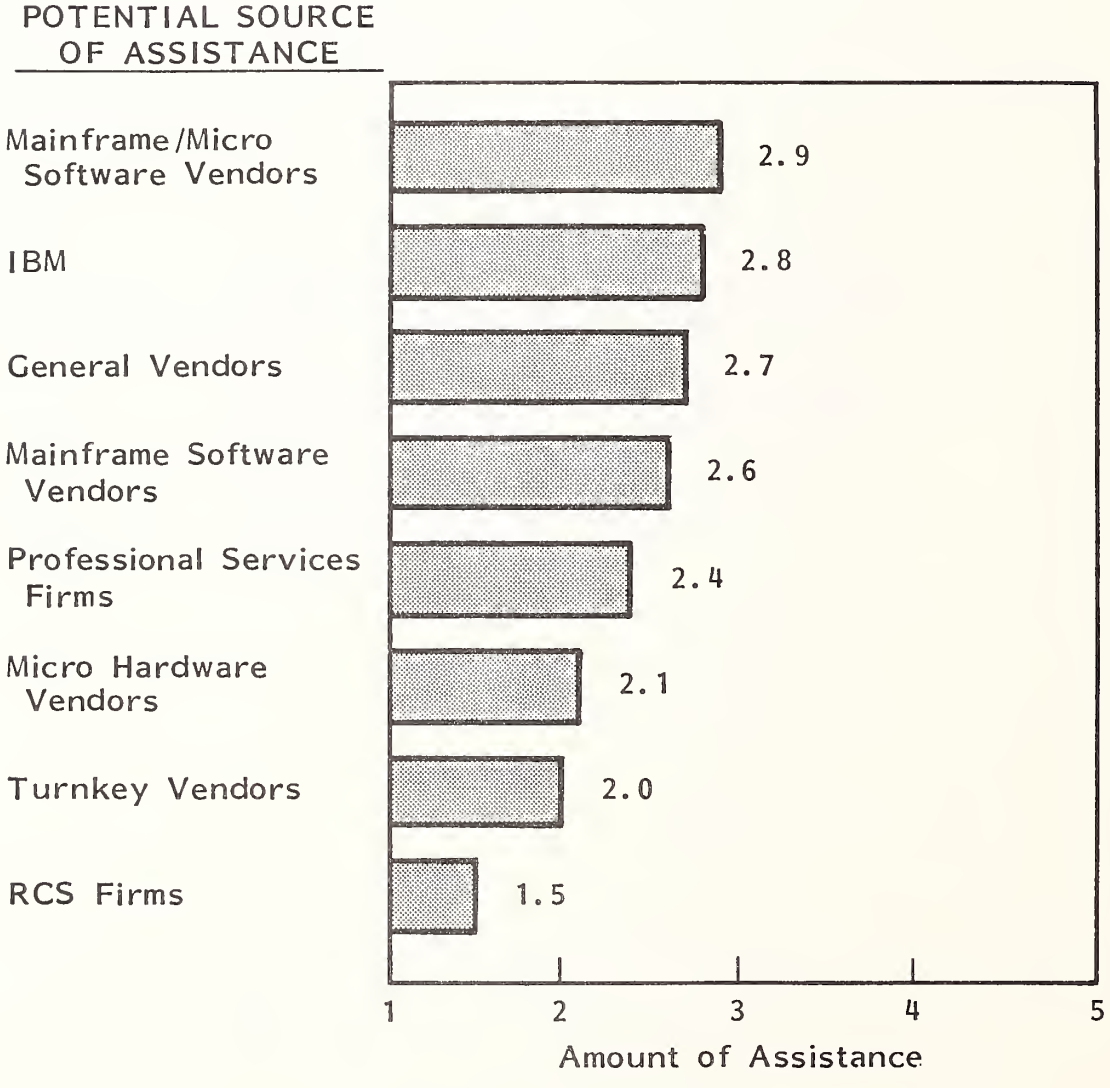
a. Thought Processors

- Today's word processors assume the author has structured his/her thoughts before interacting with the computer keyboard. Although facilities exist in word processors to move text based on changing ideas, the overall process is not designed for random collection and then wholesale reshuffling of ideas and thoughts.

- Thought processors, in contrast, provide tools to help the author organize and structure thoughts as they occur. In many ways thought processors resemble highly flexible automated index cards that can easily be created, revised,

EXHIBIT III-6

VENDOR ASSISTANCE EXPECTED IN PLANNING/IMPLEMENTING MICRO-MAINFRAME APPLICATIONS



Rating:
1 = No Assistance Expected
5 = Much Assistance Expected

resequenced, expanded or contracted. When properly used these new application tools have the potential to improve significantly the productivity of people who must construct coherent documents from hundreds or thousands of pieces of information.

- Examples of micro software products that incorporate these characteristics include:

  - ThinkTank (Living Videotex, Inc.): this is the pioneering standalone software product that put the "thought processor" concept in the public's eye. Its fundamental appeal is a powerful outlining capability. During the last half of 1984 it was one of the nation's best sellers.

  - Framework (Ashton-Tate, Inc.): this integrated analysis package was the first integrated analysis system to incorporate outlining as a key design feature.

  - Symphony (Lotus Development Corp.): not to be outdone by Framework, Lotus recently announced an add-on outlining capability available for an extra charge.

  - Other products which have arrived on the scene utilizing outlining approaches include the Idea Processor (Idea Ware, Inc.), Maxthink (Maxthink, Inc.), and THOR (Fastware, Inc.)

- INPUT believes that thought processors represent a productivity approach similar in power, simplicity and importance to electronic spreadsheets. Vendors dealing with productivity tools aimed at people who create relatively complex documents and/or outlines, should closely evaluate how their products might embrace this concept.

b. Business Psychology Support Tools

- Many books have been written about the complex task of developing psychological profiles for people, and now a new class of micro software has emerged which automates the complex process of trying to "psych out" other people. Aimed primarily at professional workers, these systems accept bits of information about a person's characteristics, and then produce text concerning strategies for dealing with them successfully.

- Examples of this type of product are published by Human Edge Software. They include Sales Edge, the Negotiating Edge and Mind Prober.

- These products represent one of the first successful attempts to sell micro software that incorporates automated psychology as a productivity tool. While these systems will not enjoy unprecedented "overnight" success, INPUT believes they add a new dimension to the concept of automated decision support tools and thus will evolve to become a "legitimate" component of such systems. Vendors active in decision support applications should track and assess the potential of such products for their market area.

c. Management Activation Systems

- This new category of micro software provides tools to help users identify areas needing management action, and/or to structure the process of collecting and processing information related to management activities.

- Two recently announced products that address this area have been receiving considerable attention. They are Trigger from Thoughtware, Inc. and Lightyear from the firm also called Lightyear.

- Trigger is a management assistance tool that enables a decision-maker to specify under what quantifiable conditions action should be taken. Trigger provides report generation, memo and letter-writing capabilities that are

automatically triggered whenever those conditions occur. For example, a controller may decide that whenever monthly sales in a territory fall below 75% of quota year-to-date the following actions should be taken: (1) send a report and letter to the salesperson and the sales manager asking for an explanation, (2) alert manufacturing and distribution of a possible inventory buildup problem, and (3) notify the financial analysis staff of the possible need for a profit review.

- Lightyear is a product that enables users to define and evaluate decisions of a complicated nature. It helps identify criteria that are relevant to the decision, and then provides an avenue for the criteria to be applied. The product is designed to enhance the quality of important business decisions.

- Several decades ago railroad companies made the mistake of forgetting that they were in the transportation business, and they did nothing to preempt the emergence of airline competitors. To avoid repetition of such a mistake it is vital for micro software product planners to view their product line far beyond its current capabilities. Thus, for example:

  - Word processing vendors should assess if they should be in the thought processing business.

  - Data base management systems vendors should decide if they are in the data, text and/or image information storage and retrieval business.

- The very nature of the micro lends itself to more intimate involvement with the users. The long-term victors in the micro software race will be those whose vision of the application opportunities extends far beyond today's limited approaches.

C. SUPPORT

- The increasing population of computer-experienced users is generating demand for stronger vendor support at distribution and end-user levels. These support requirements include training, documentation, maintenance, and hotline offerings.

- Because microcomputer hardware and software acquisition within larger organizations is shifting toward centralized purchasing which is controlled by the information systems department, acquisition criteria (usually applied to mainframe/mini software vendors) are now being applied to PC software vendor selection.

- As shown in Exhibit III-7, users rank documentation and vendor support right behind ease of implementation in terms of importance.

- Many vendors are abdicating their customer support responsibility. Most software firms are small and have limited resources, thus they skimp when it comes to providing support.

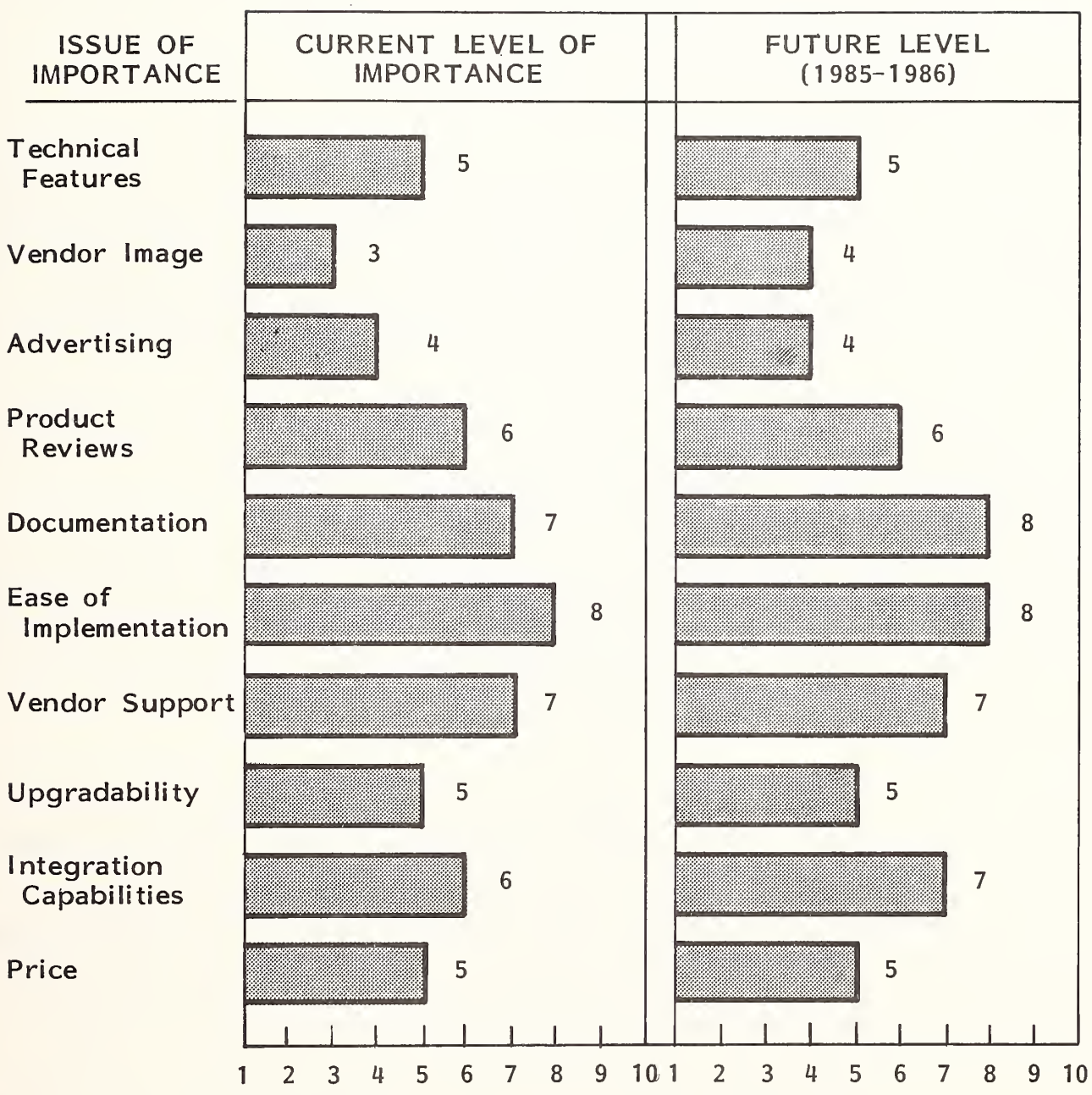
- The larger firms appear to be doing a better job of providing support, mainly by telephone. The firms noted for their support include Microsoft, Lotus, Ashton-Tate, and Software Publishing. The latter vendor's long-term strategy is to attempt, through product design, to reduce support requirements significantly.

- Some vendors are offering better support within the product itself. Providing more robust and sophisticated "help" functions is one method. Some firms, most notably Micropro with WordStar and Innovative Software with their Smart Series, offer variable levels of support in their help functions. That is, the user will be provided with a different level of support, depending on whether the user is an expert, intermediate, or beginner.

EXHIBIT III-7

MICRO SOFTWARE SELECTION ISSUES

(Business Use)



Rating: 1 = Low, 10 = High

- Few remote diagnostics are being offered yet, but it will eventually happen. This is most likely to happen with UNIX-based microcomputers, because UNIX is especially well suited for remote diagnostics.

- Some vendors are offering self-diagnostics, similar to what is found on minis and mainframes. That is, the program can find or answer problems itself.

- Examples of vendor support activity include:

  - Digital Research: they have announced an agreement with The Source (an on-line data base vendor) to provide on-line help to Digital's customers. Digital discovered through their research that 80% of the support calls they received dealt with the same 100 problems. Thus, they felt that they could put all the support answers on a data base.

  - IBM: they charge separately for their support. Users can sign up for either a yearly program or they can pay $40 a call.

  - Personal Touch Computer Advisory Service: this national organization helps people select a system and provides hotline support after they purchase it. Subscribers pay an annual membership fee of $195 for the service, which includes a toll-free 24-hour hotline.

  - Intersol: this company was formed to provide technical service over the telephone to IBM PC and Apple Computer users. They offer the technical telephone support that will aid in the use of more than 30 software programs. Their fee is $300 a year for an unlimited number of questions. Alternatively, they offer a one-time-only fee of $50 and then require users to pay $10 per phone call after the first call.

  - Teletech Service: Mayday is Teletech's PC support service. It provides 120 minutes of telephone software support on an annual contract

basis. Each call usually lasts five to seven minutes. A software engineer is allowed only seven minutes per call. If the call cannot be handled in seven minutes, the engineer tells the customer that Teletech will call back.

- Most calls (80%) can be handled in seven minutes because the information is on a data base. The remaining (20%) calls are researched, the customer is called back and given the information, and the information is put on the data base.

- The information for the data base comes from Teletech's parent (Software Wholesalers), which is known for having good technical support for its dealer network. Their technicians have been recording information for the past three-and-one-half years, so the data base is quite large.

- Mayday provides support for over 350 software packages. It is an 18-hour, 6-day service. Approximately 10,000 units have been sold since it was available six months ago. The cost is $200 retail. Also included is a guide for self troubleshooting. Because each call is five to seven minutes, most companies can get in 35 to 40 calls per year.

IV MARKET FORECASTS AND ANALYSIS

IV MARKET FORECASTS AND ANALYSIS

A. MICROCOMPUTER HARDWARE TRENDS

1. INSTALLED-BASE TRENDS

- The microcomputer hardware market is entering a shakedown phase which is market-share-driven as opposed to technology-driven. The old 80/20 rule is starting to take effect. (i.e., 80% of the market will be controlled by 20% of the vendors). Marketing and its end results, shelf space and name brand recognition, are becoming the determining factors for increased sales, as opposed to technological wizardry or aesthetics.

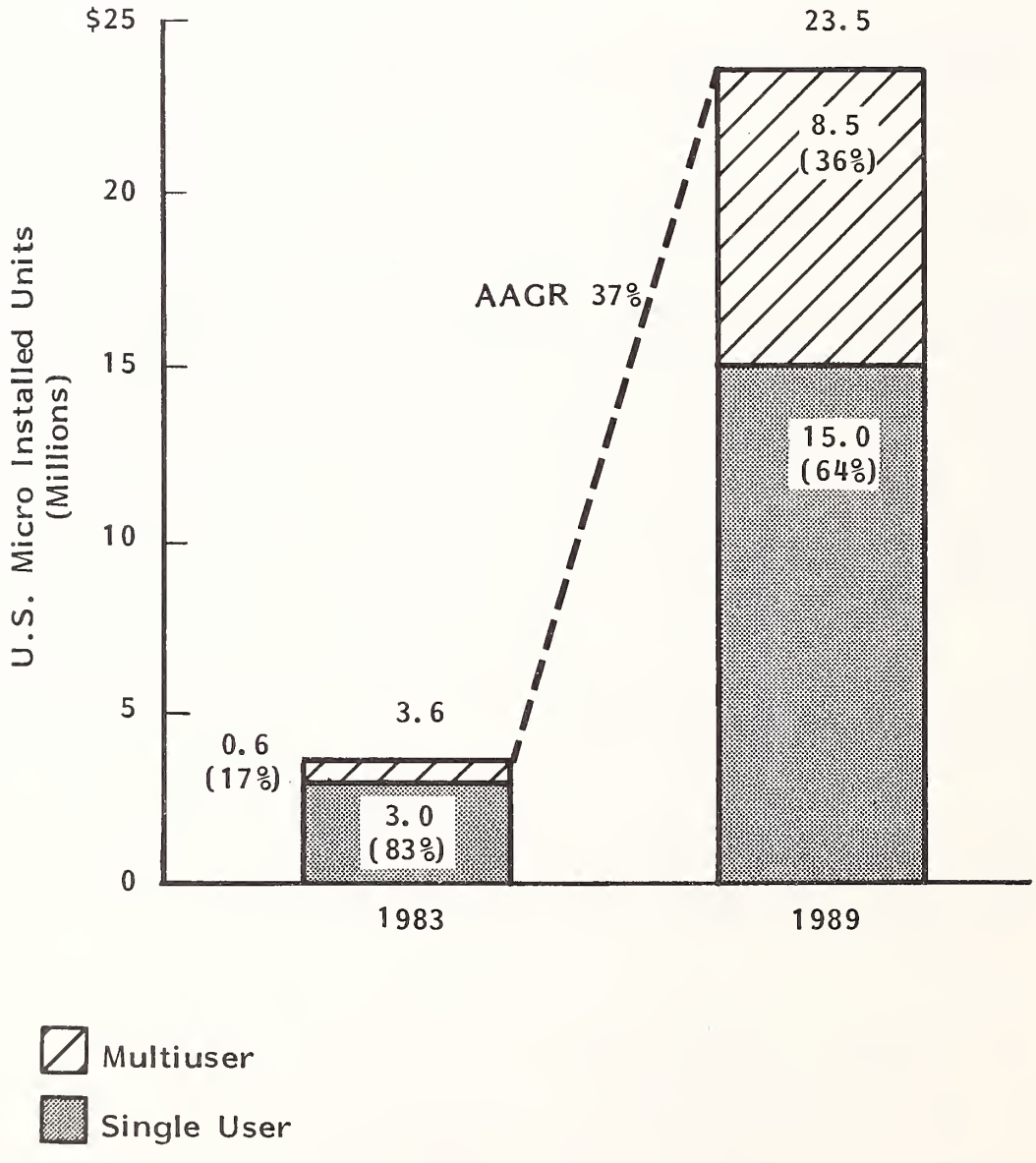
- INPUT forecasts a more than sixfold increase in hardware units by the end of the decade, as shown in Exhibit IV-1.

- Whereas 17% of the units in 1983 were classified as multiuser systems, by 1989 these more powerful computers will have a 36% share of the hardware population.

- Although this expansion of the installed base represents one of the most powerful factors stimulating the micro software market, it is important to recognize that the rate of growth of this base will slow considerably during this five-year period.

EXHIBIT IV-1

INSTALLED BASE OF MICROCOMPUTERS, 1983-1989



- Exhibit IV-2 shows that the net annual addition to the installed base will peak in 1986 and then decline significantly. While installed systems will continue to expand in terms of power (via additions of internal memory, external storage, input, output devices, etc.) throughout the next five years, the number of net new processing units will decline.

- The primary cause for this phenomenon is desktop saturation. Exhibit IV-3 shows this effect by profiling micro workstation terminals as a percent of the U.S. labor force. From a penetration of 4% in 1983, micros will more than triple to 13% by 1985 and will eventually be visible in 28% of the entire U.S. labor force's work areas by 1989. Just as with televisions, telephones and microwave ovens, there are upper limits to the acceptance of innovative products no matter how great their appeal.

- When the saturation issue is examined from the point of view of the white collar population, the cumulative impact of annual micro hardware sales in the millions of units becomes even more evident. By 1989 more than 50% of white collar employees will have micros at their workplace.

- The advantage that micro software vendors have over hardware vendors, of course, is that several times the cost of the hardware can be spent on software. However, an especially key skill for micro software vendors during the next several years will be realistic market planning in view of saturation considerations.

- Appendix B-1 provides detailed hardware forecasts by year for 1983 through 1989.

2. CONFIGURATION CONSIDERATIONS

- Some hardware trends are now apparent which differentiate more clearly the individual markets:

EXHIBIT IV-2

ANNUAL MICRO INCREASE
TO PEAK IN 1986

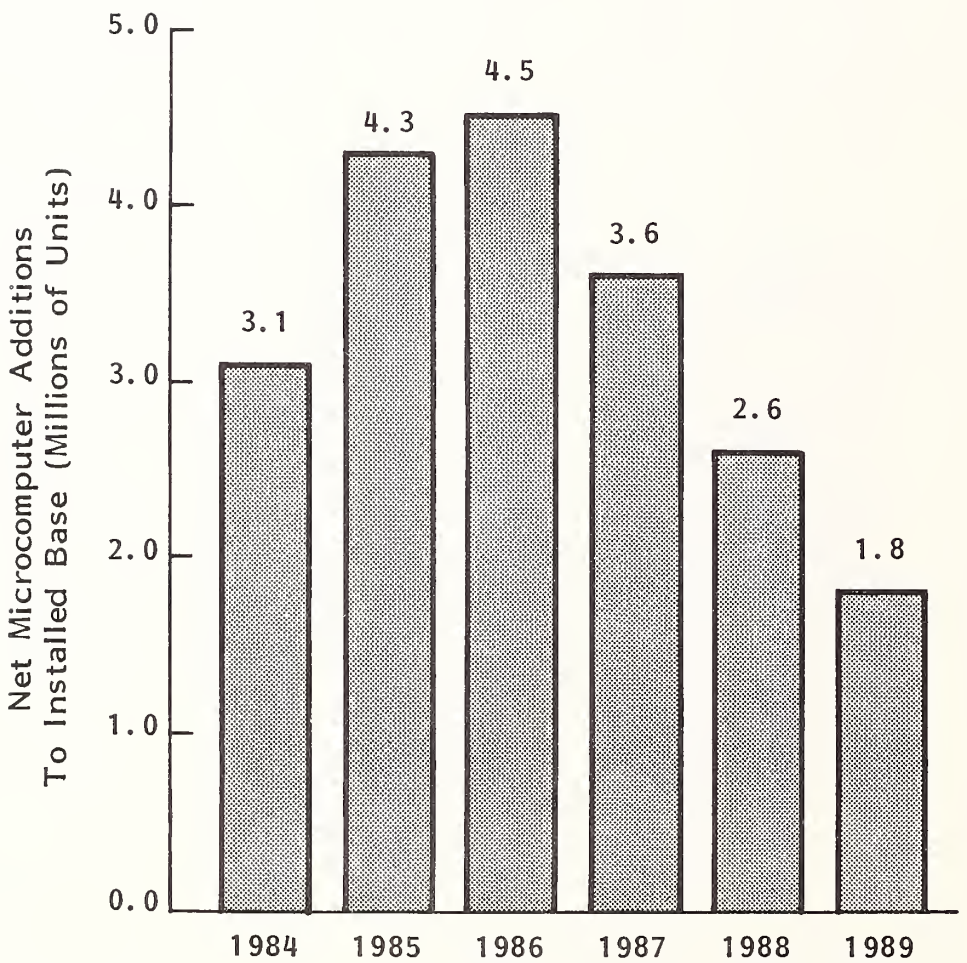
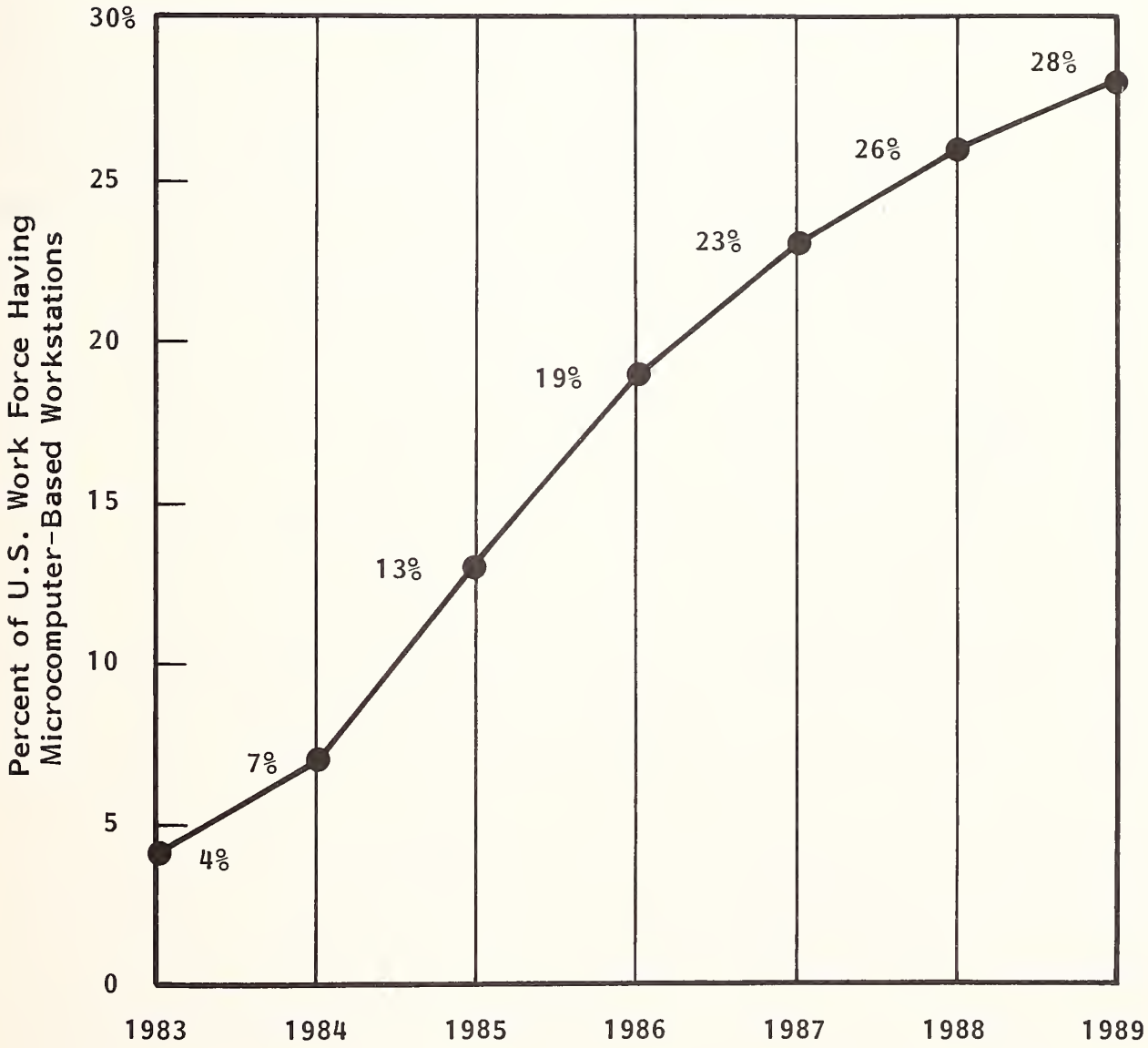


EXHIBIT IV-3

PENETRATION OF MICROCOMPUTERS IN BUSINESS, 1983-1989



- Microcomputers for office systems (OS) use generally require a 16-bit or 16/32 microprocessor, a minimum of 256K of RAM, some Local Area Networking (LAN) upgradability, and a widely accepted operating system such as MS-DOS or UNIX. Driving forces for user choices include name brand recognition associated with product reliability, vendor support, maintenance capabilities and in-house opinions from information systems personnel.

- Microcomputers for industrial automation focus on reliability, maintenance and micro-mainframe capabilities. Integration into larger systems is the key element in user choice. Most industrial PCs are expected to double up as process control modules, inventory control terminals, testers or programmable controllers. Software is the major factor for initial hardware selection since most industrial PCs are currently required to fit into an existing network.

- The typical configuration for a desktop business micro acquired in the 1985-1986 timeframe will be:

  - Sixteen or 32 bit.

  - One disk drive (5 1/4 or 3 1/2 in newer or portable models).

  - Ten megabytes of storage capacity through hard disk.

  - Internal memory of 512K (one megabyte after 1986).

  - RS232 or RS442 ports.

- Most PCs will be able to integrate easily into some type of local area network.

- Close to one half of all desktop micros will have 3270 (or equivalent) emulation capability.

- Modems in the 1200 to 4800 baud range will appear in increasing numbers.

- Although the average speed and bit size is moving up, the market will stabilize by 1987 with a 32-bit microprocessor-based product at the upper end of the scale and 16-bit (small business, education, single task) machines remaining in demand for specific applications.

B. APPLICATION SOFTWARE FORECASTS AND ANALYSIS

1. CROSS-INDUSTRY APPLICATIONS

a. Overview

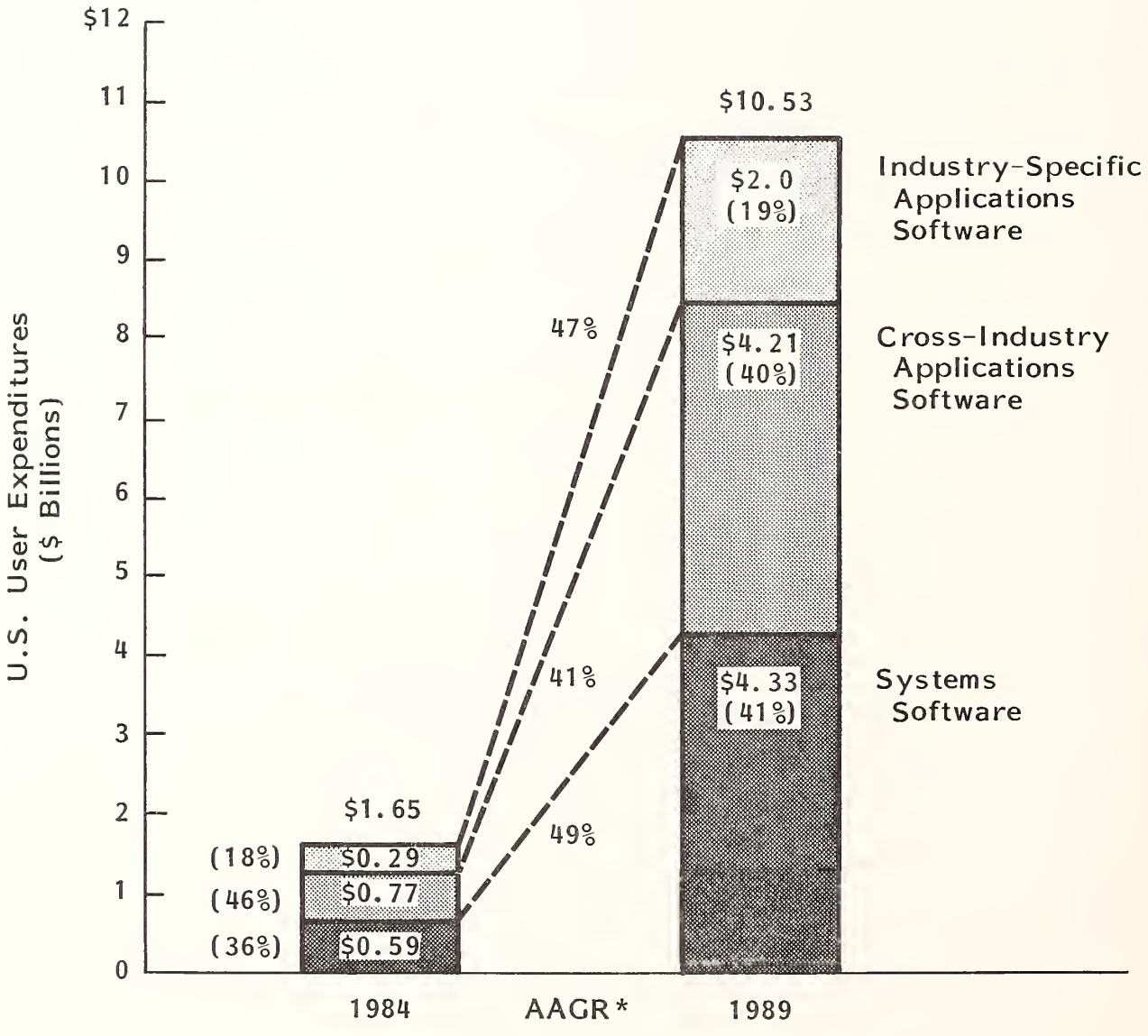
- The cross-industry market is the largest of the three major PC software components, at $770 million for 1984, as shown in Exhibit IV-4.

- The cross-industry market is growing at a healthy 41% annually for the next five years, to become a $4.2 billion opportunity by 1989. As a result, cross-industry market size will increase more than five-fold by the end of the decade.

- Exhibit IV-5 profiles the sizes and growth rates of each of the cross-industry market segments analyzed in this report. Refer to Exhibit I-1 for examples of applications included within each of these segments. Each of the segments is discussed below.

EXHIBIT IV-4

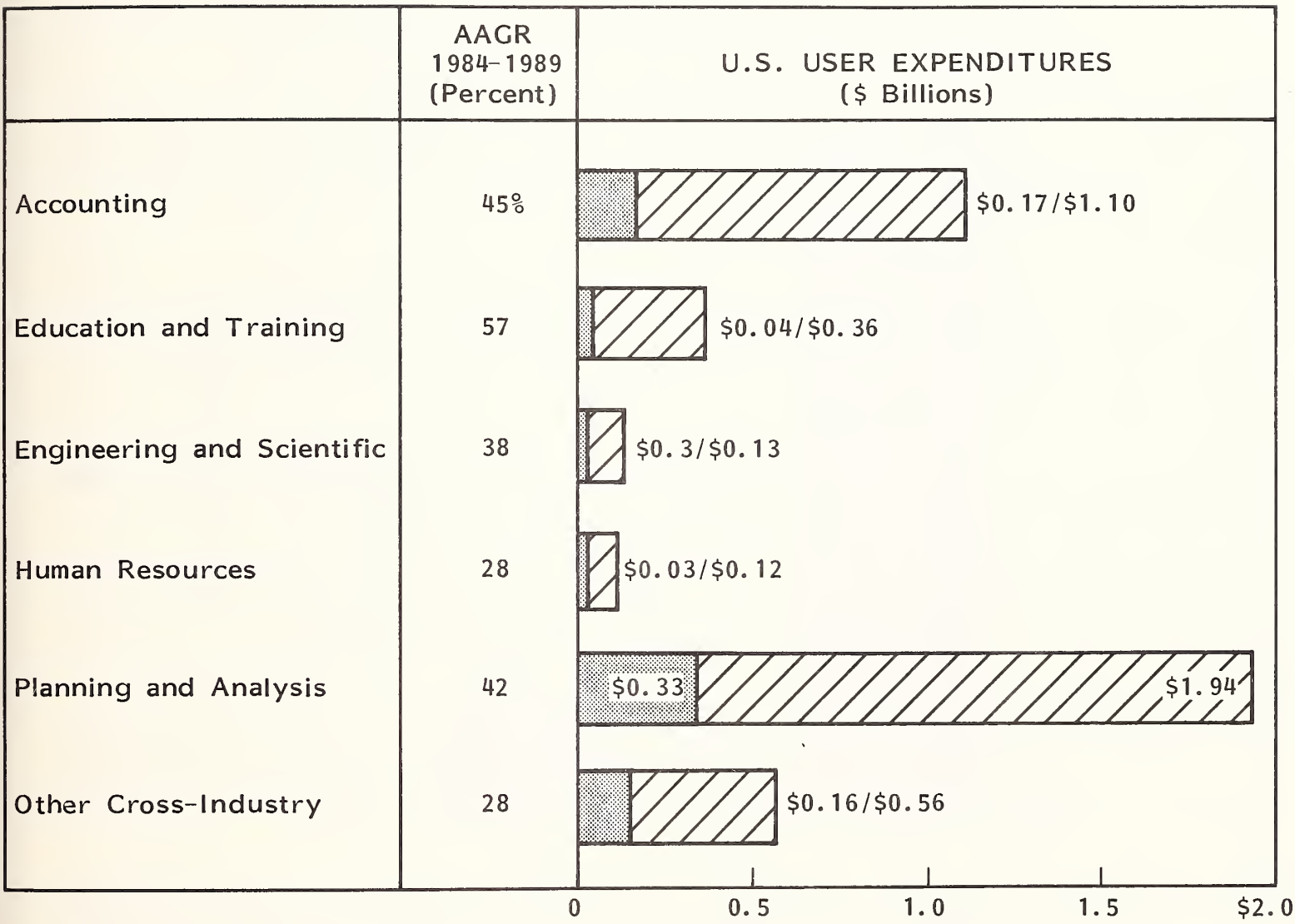
MICROCOMPUTER SOFTWARE MARKET,
1984-1989

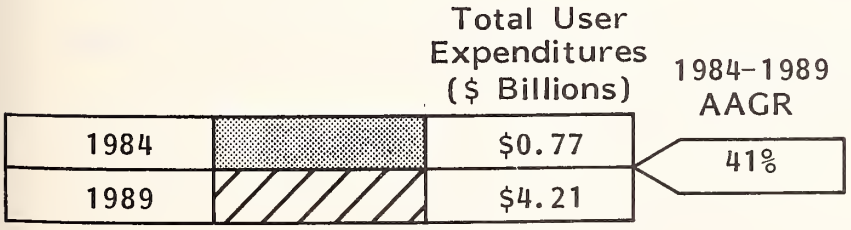


* Average Annual Growth Rate

EXHIBIT IV-5

CROSS-INDUSTRY MICROCOMPUTER APPLICATIONS SOFTWARE MARKETS, 1984-1989





b. Accounting

- Accounting is the second largest cross-industry micro software market in terms of size (planning and analysis is largest). As shown in Exhibit IV-6, this segment will almost triple in size in the next five years by growing 45% annually from a 1984 base of $1.2 billion to $3.3 billion by 1989.

- The micro software accounting market has paralleled the mainframe/mini accounting market development in that it was an early and popular application to install on a new machine.

- However, micro accounting software's market share of all software does not enjoy the extent of penetration that, for example, planning and analysis micro software has realized.

  - Micro accounting's 1984 share of 17% of the software market is close to one-half that obtained by planning and analysis.

  - By 1989 micro accounting will have obtained 33% of the software user expenditures, versus 49% for planning and analysis.

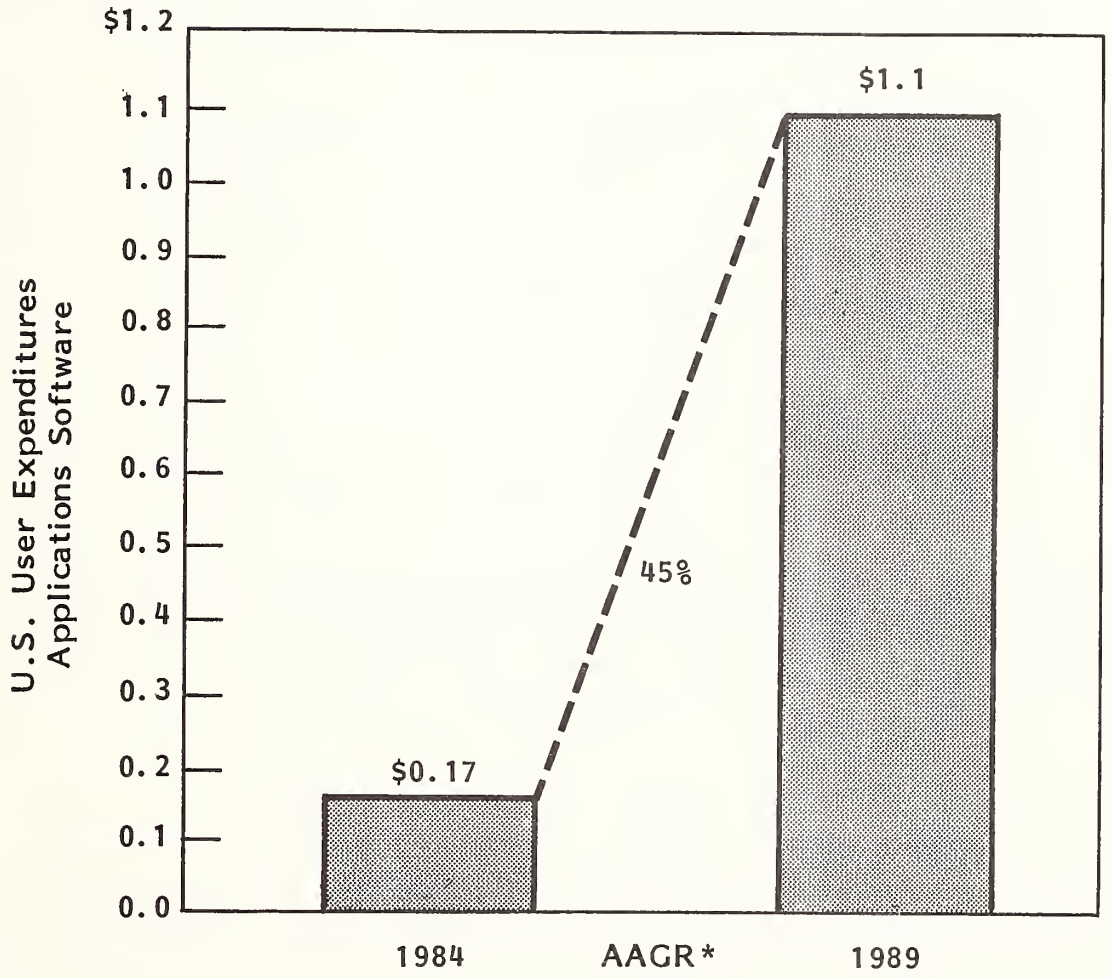
- This lower rate of penetration for accounting is due in part to the nature of the application, which is transaction-oriented. Systems of this type can quickly exceed the capabilities of even large micros.

- Competition in the micro accounting marketplace can be brutal. MSA's recent decision to sell Peachtree Software due to sustained losses at the retail level is prime evidence.

  - On the surface MSA's position as a leading mainframe/mini financial software vendor seemed an intriguing match to Peachtree's high visibility offerings of similar applications.

EXHIBIT IV-6

ACCOUNTING MICRO APPLICATIONS SOFTWARE MARKET, 1984-1989
(Cross-Industry) ($ Billions)



	Micro Applications Software 1989 Market†	
	Cross-Industry Only	All Applications Software
Size (Rank)	2 (6)	2 (10)
Growth Rate Rank	2 (6)	10 (16)

*Average Annual Growth Rate

†Parenthesis shows the number of segments ranked.

- However, managing two different distribution environments (direct sales to large corporations versus retail sales to small business) aimed at two different market segments is a task MSA found was too great a strain on management talents.

- IBM's recent announcement of their own accounting system demonstrates their aggressiveness in the micro applications software market.

- Micro software vendors intent on battling successfully in this marketplace should remember that integration with other systems will increase in importance. Thus, integration must be a fundamental part of the product strategy. This integration should include:

  . Other transaction processing systems.

  . Retrieval systems (languages, report writers, etc.)

  . Data base management systems as the underlying architecture.

  . Micro-mainframe links.

c. Education and Training

- The education and training segment encompasses software purchased by organizations to help individuals develop knowledge or skills. This segment excludes software purchased by schools and colleges. This latter category is classified as education/industry specific.

- The education and training segment includes both training users how to use computer systems, as well as using computers to train workers in all subjects, including noncomputer topics.

- The micro software portion of education and training is the fastest growing of all micro software segments. Its 57% average annual growth rate will take this market from a 1984 base of $40 million to $360 million by 1989, as shown in Exhibit IV-7.

- Major stimulants for this market include:

  - Sixfold growth in the installed base of microcomputers by 1989 (see Chapter IV, Section A.1 for a more detailed discussion of this hardware forecast).

  - Growth in end users anxious to use a personal computer. By 1989 INPUT estimates that over 40 million white collar workers will have access to microcomputers. These users will need courseware that itself utilizes the micro resource.

  - The rapid evolution of graphics capabilities, including videotex and the marriage of optical disk technology to the microcomputer, are all technological developments which will help boost the education and training software market.

- A number of vendors, both large and small, are active in this marketplace. Leading vendors (and their products) of microcomputer-based authoring systems (i.e., systems used as tools to build computer-based courses) include:

  - Ashton, Inc. (Interact).

  - Bell and Howell (Professional Authoring Software System, Video Courseware Development System).

  - Cavri Systems (Ghostwriter).

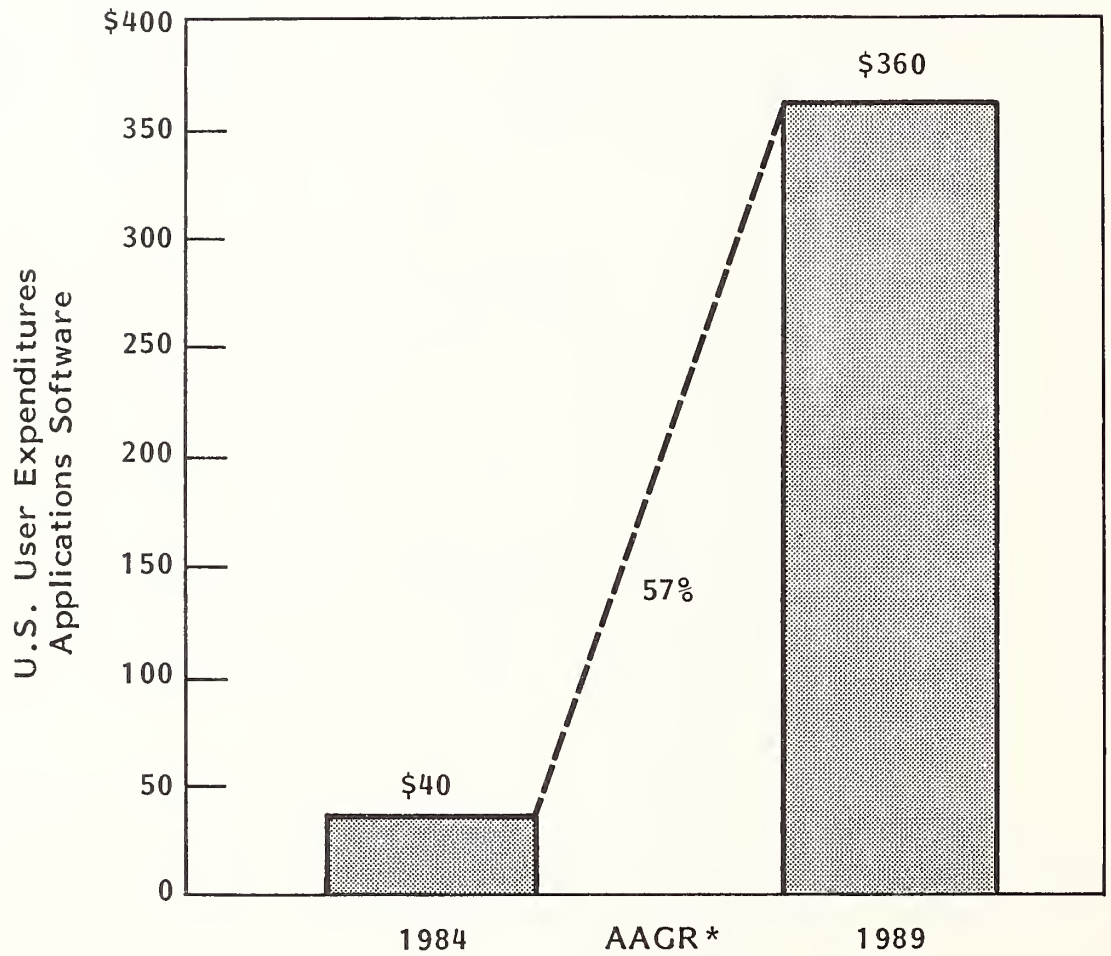
  - Interactive Training Systems (Authority).

EXHIBIT IV-7

EDUCATION AND TRAINING

MICRO APPLICATIONS SOFTWARE MARKET, 1984-1989

(Cross-Industry) ($ Millions)



	Micro Applications Software 1989 Market†	
	Cross-Industry Only	All Applications Software
Size (Rank)	4 (6)	5 (16)
Growth Rate Rank	1 (6)	1 (10)

*Average Annual Growth Rate

†Parenthesis shows the number of segments ranked.

- Examples of vendors offering microcomputer-based courses are:

  - American Training International Inc.

  - CDEX Corporation.

  - Micro Mentor.

  - National Training Systems, Inc.

d. Engineering and Scientific

- Micro software will remain a relatively small part of the total engineering and scientific applications software market for the next five years.

  - From a 1984 base of $30 million (14% of the market), micro software in this segment will grow to $130 million by 1989 (24% of the software market). See Exhibit IV-8.

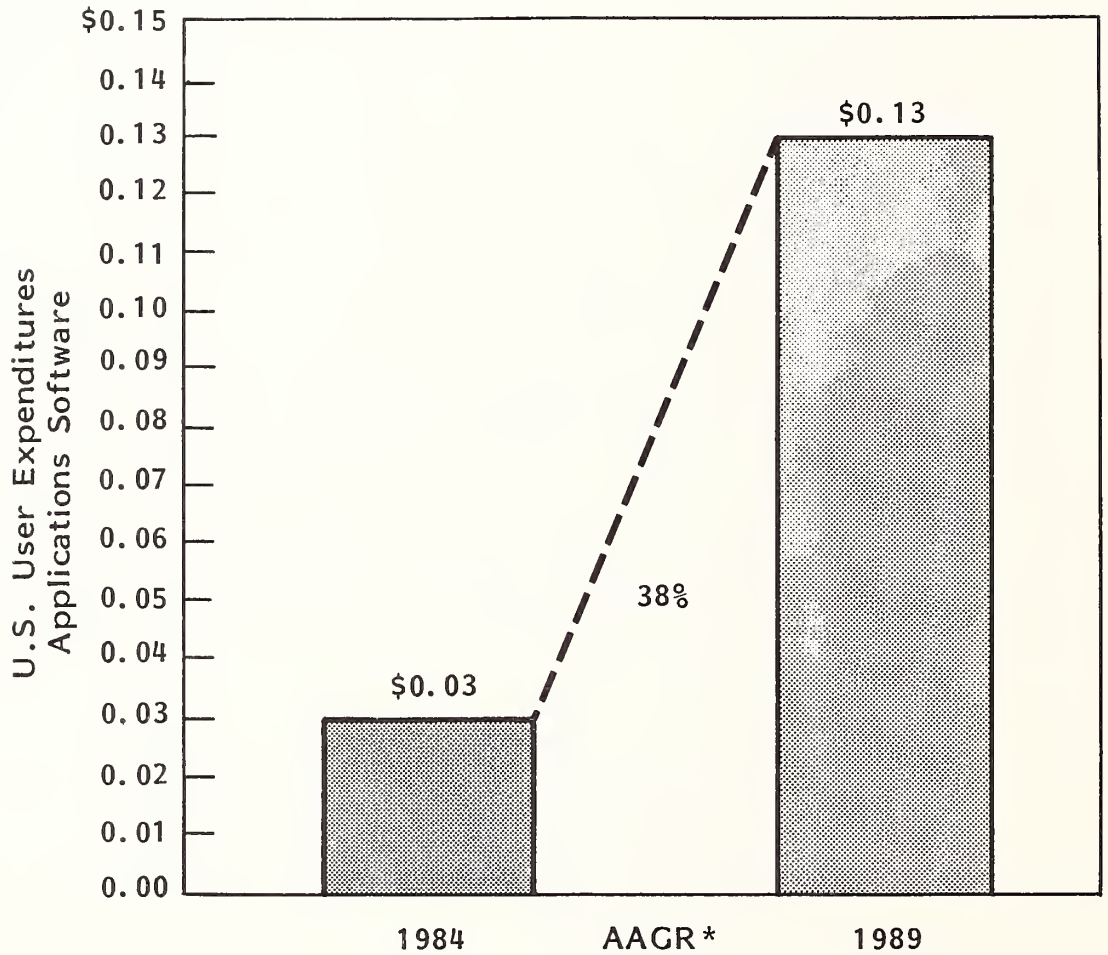
  - The engineering and scientific micro software growth rate of 38%, while significantly above many other information services markets, has one of the lowest annual increases within the cross-industry and industry-specific micro markets.

- A good deal of the "action" in the engineering and scientific area is taking place with super micro-based turnkey systems in the CAD/CAE area, such as those offered by Daisy Systems and Valid Logic. These user expenditures are classified as turnkey and thus are excluded from the software products delivery mode market composition.

- Vendors active in the micro software engineering and scientific segment include:

EXHIBIT IV-8

ENGINEERING AND SCIENTIFIC
MICRO APPLICATIONS SOFTWARE MARKET, 1984-1989
(Cross-Industry) ($ Billions)



	Micro Applications Software 1989 Market†	
	Cross-Industry Only	All Applications Software
Size (Rank)	5 (6)	10 (16)
Growth Rate Rank	4 (6)	13 (16)

*Average Annual Growth Rate

†Parenthesis shows the number of segments ranked.

- Celestial Software Inc. (Images-2D).

- Software Arts (TK! SolverPack).

e. Human Resources

- The human resources segment is comprised principally of payroll, personnel, benefits and human resource-related management systems.

- As shown in Exhibit IV-9 this market is one of the smallest and slowest growing segments of the entire micro software industry. Nevertheless, the 28% annual growth in micro software human resource applications is almost twice the (15%) growth rate expected from mainframe/mini software products for these same applications.

- The micro software portion of the market will grow from $30 million in 1984 to $120 million in 1989. Although payroll is one of the most prevalent automated applications throughout industry, the continually changing complexities of tax laws and governmental reporting requirements enhance the appeal of processing services vendors who handle such problems cost-effectively due to their economies of scale.

- In spite of these inherent deterrents, several factors will serve to keep this market growing:

  - The sheer volume of micro hardware sales will provide millions of new users with the opportunity to try payroll/personnel software.

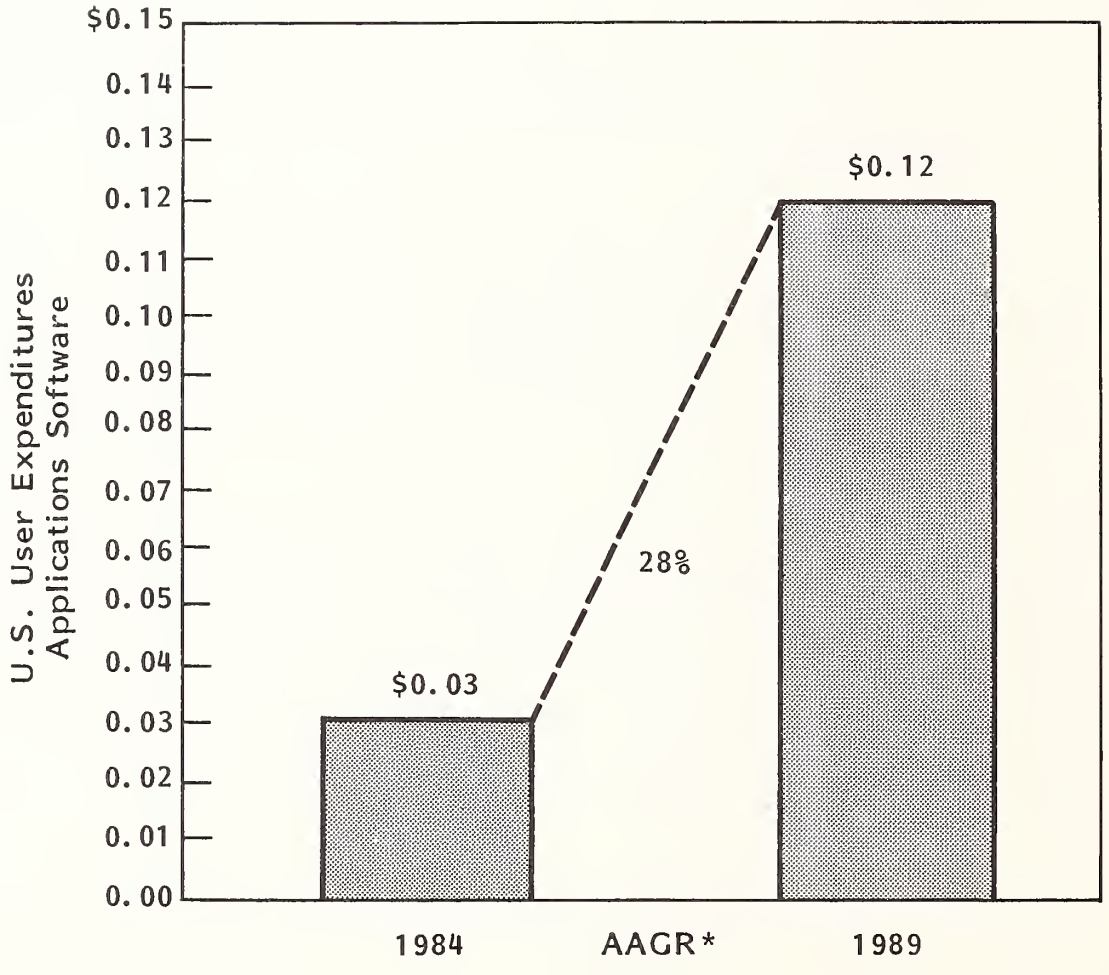
  - More powerful micro hardware (e.g., IBM PC AT et al.) and improved micro-mainframe links will ease the burden of transaction processing inherent in these applications.

EXHIBIT IV-9

HUMAN RESOURCES

MICRO APPLICATIONS SOFTWARE MARKET, 1984-1989

(Cross-Industry) ($ Billions)



	Micro Applications Software 1989 Market†	
	Cross-Industry Only	All Applications Software
Size (Rank)	6 (6)	11 (16)
Growth Rate Rank	6 (6)	15 (16)

*Average Annual Growth Rate

†Parenthesis shows the number of segments ranked.

- Vendors active in this marketplace include:

  - BPI Systems.

  - IBM.

  - Micro Business Software.

  - Peachtree Software (currently a division of MSA).

  - Sorcim/IUS (a division of Computer Associates).

f. Planning and Analysis

- Planning and analysis microcomputer software is the largest market segment in the entire PC applications software arena. From a 1984 base of $330 million, this segment will grow 42% annually to become a $1.9 billion market by 1989, as shown in Exhibit IV-10. Throughout this period it will keep its almost twofold lead over the second largest cross-industry segment, accounting.

- As the market segment that legitimated personal computers via Visicalc several years ago, planning and analysis's dominance of the PC software for the foreseeable future is due to a number of factors including:

  - Its use as managerial/professional application: this category of office worker, which accounts for as much as two-thirds of the cost of an office, is eagerly embracing personal computing. Their most common needs relate to decision support which in turn leads to planning and analysis.

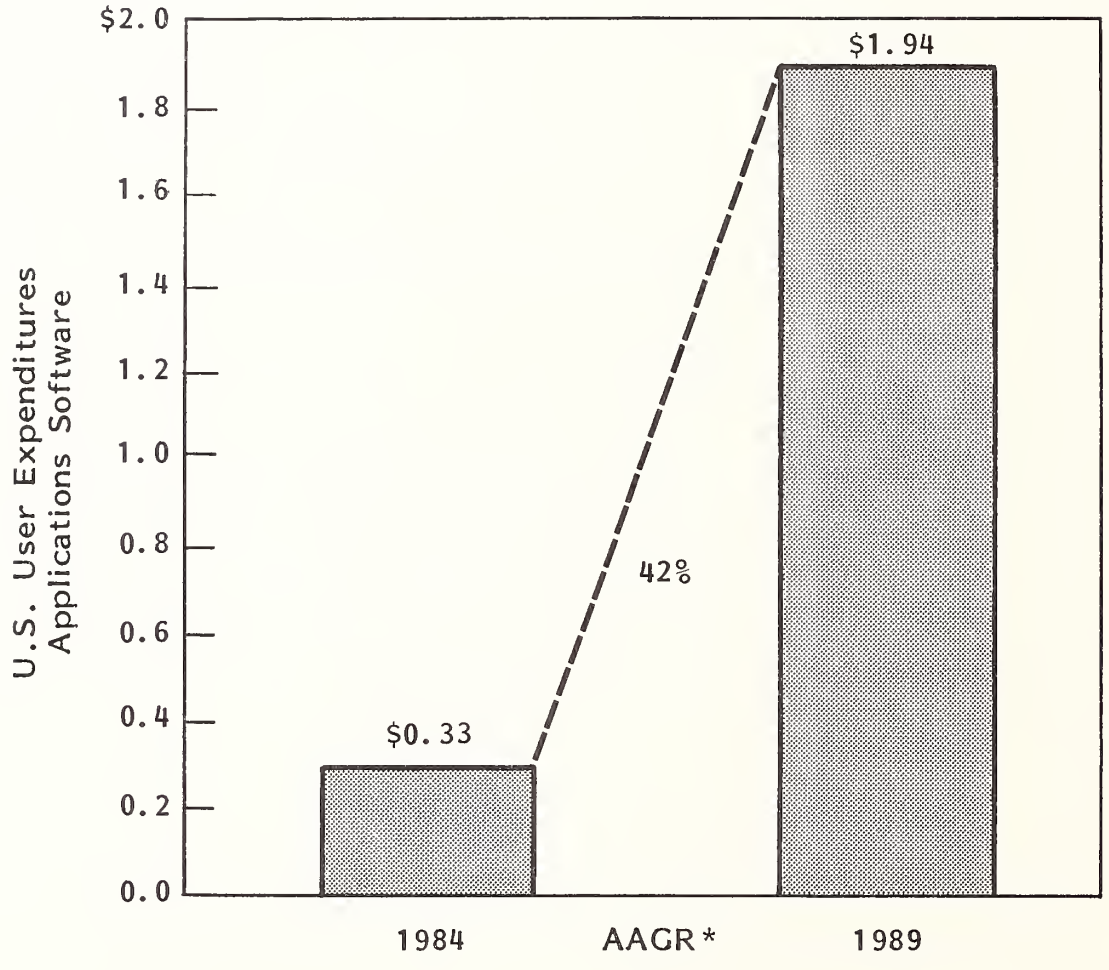
  - The increasing popularity of information centers that provide the support environment that encourages end users to try more ambitious

EXHIBIT IV-10

PLANNING AND ANALYSIS

MICRO APPLICATIONS SOFTWARE MARKET, 1984-1989

(Cross-Industry) ($ Billions)



	Micro Applications Software 1989 Market†	
	Cross-Industry Only	All Applications Software
Size (Rank)	1 (6)	1 (16)
Growth Rate Rank	3 (6)	11 (16)

*Average Annual Growth Rate

†Parenthesis shows the number of segments ranked.

applications. INPUT forecasts that the 1984 base of 2,000 information centers in the U.S. will increase two-and-one-half times to reach 5,000 by 1989.

- Development of more people-sensitive software products (i.e., fourth-generation languages and relational data base management systems) which make planning and analysis applications more appealing to a broader range of users.

g. Other Cross-Industry

- This segment contains applications not classified elsewhere. Included are such applications as business graphics, word processing, and mail lists.

- This segment ranks close to the average of cross-industry segments in terms of size. From a base of $160 million in 1984, user expenditures will grow to $560 million by 1989, an annual growth rate of 28%, as shown in Exhibit IV-11.

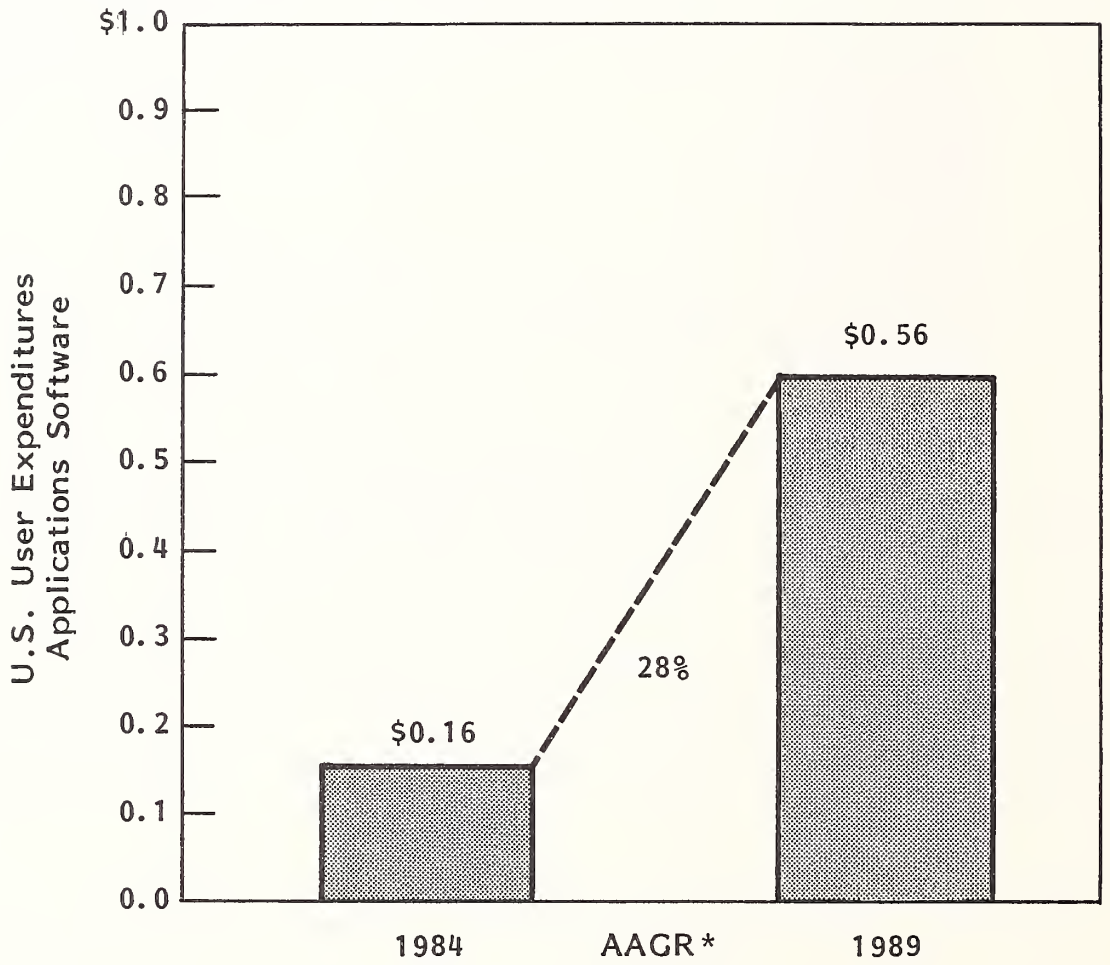
- Business graphics are increasingly being offered as an integrated function, thereby simplifying the user's interface problems. This phenomenon, however, results in graphics-related revenues being assigned to other market segment categories.

- Word processing software is still the most common software product purchased with initial hardware sales. More vendors are offering PC word processing applications than any other package. The great majority of word processing packages are retailed under a hardware manufacturer's label (e.g., IBM, Apple, Wang). Only one software house, Micropro International with its WordStar system, has captured more than 10% of the market.

- Sharper product definitions are beginning to appear. Word processing packages are now classified into two broad categories: professional and general.

EXHIBIT IV-11

OTHER CROSS-INDUSTRY
MICRO APPLICATIONS SOFTWARE MARKET, 1984-1989
($ Billions)



	Micro Applications Software 1989 Market†	
	Cross-Industry Only	All Applications Software
Size (Rank)	3 (6)	4 (16)
Growth Rate Rank	6 (16)	16 (16)

*Average Annual Growth Rate

†Parenthesis shows the number of segments ranked.

- Professional word processing applications, such as Micropro's Wordstar and Wang's word processor, are very powerful. They allow expert users to manipulate and edit large volumes of data through global commands. Historically, these products have encompassed these features by sacrificing ease-of-use. However, new releases, such as Wordstar 2000 by Micropro, are addressing this need.

- General word processing applications, such as Bank Street Writer, PFS: Write, and Lifetree's Easywriter, have been aimed at the manager or student who need to create relatively short documents (under 50 pages) on a nonrecurring basis.

- Sales and marketing applications are beginning to emerge after a long period of gestation. The marketing department of most organizations has been one of the last to automate. However, the complexities of competing in today's marketplace have finally convinced many inherently "gut feeling-oriented" marketing managers to look for ways to enhance their decision making with data-based information.

2. INDUSTRY-SPECIFIC MARKETS

a. Overview

- Industry-specific micro applications software will grow an impressive 47% annually to become a $2.0 billion market in 1989, up from $290 million in 1984. Its share of the total micro software market will rise from 18% in 1984 to 19% in 1989. (See Exhibit IV-4.)

- While industry-specific markets tend on the average to be smaller than the cross-industry segments analyzed in the previous sections, they are growing much faster. For example:

- Banking and finance, the largest of the industry-specific segments, is almost two-thirds smaller than the number one cross-industry market (planning and analysis). (See Exhibits II-3 and II-4.)

- However, when the top six fastest growing segments are tabulated, as shown in Exhibit IV-12, industry-specific applications comprise five of the six entries.

- The nine major industry-specific micro software markets are profiled in the next section. (See Exhibit II-4 for a summary comparison of their market sizes and growth rates.)

b. Banking and Finance

- At $600 million in user expenditures in 1989, banking and finance micro software is the largest industry-specific application market, as shown in Exhibit IV-13. At a 50% annual growth this segment is one of the fastest growing industry-specific markets.

- This market segment has recently "come alive," having grown 100% ($40 million to $80 million) in the 1983-1984 period. Micro software is now actively used in such areas as loan origination, branch control and administration, shareholder accounting, credit analysis, discount brokerage and asset/liability management.

- Factors that are stimulating overall banking and finance micro software growth are:

  - Grass roots demand: INPUT's annual survey of information systems executives reveals this industry segment gives higher priorities to end-user computing activities than almost all other industries.

EXHIBIT IV-12

TOP SIX FASTEST GROWING PERSONAL COMPUTER APPLICATIONS
SOFTWARE MARKETS, 1984-1989

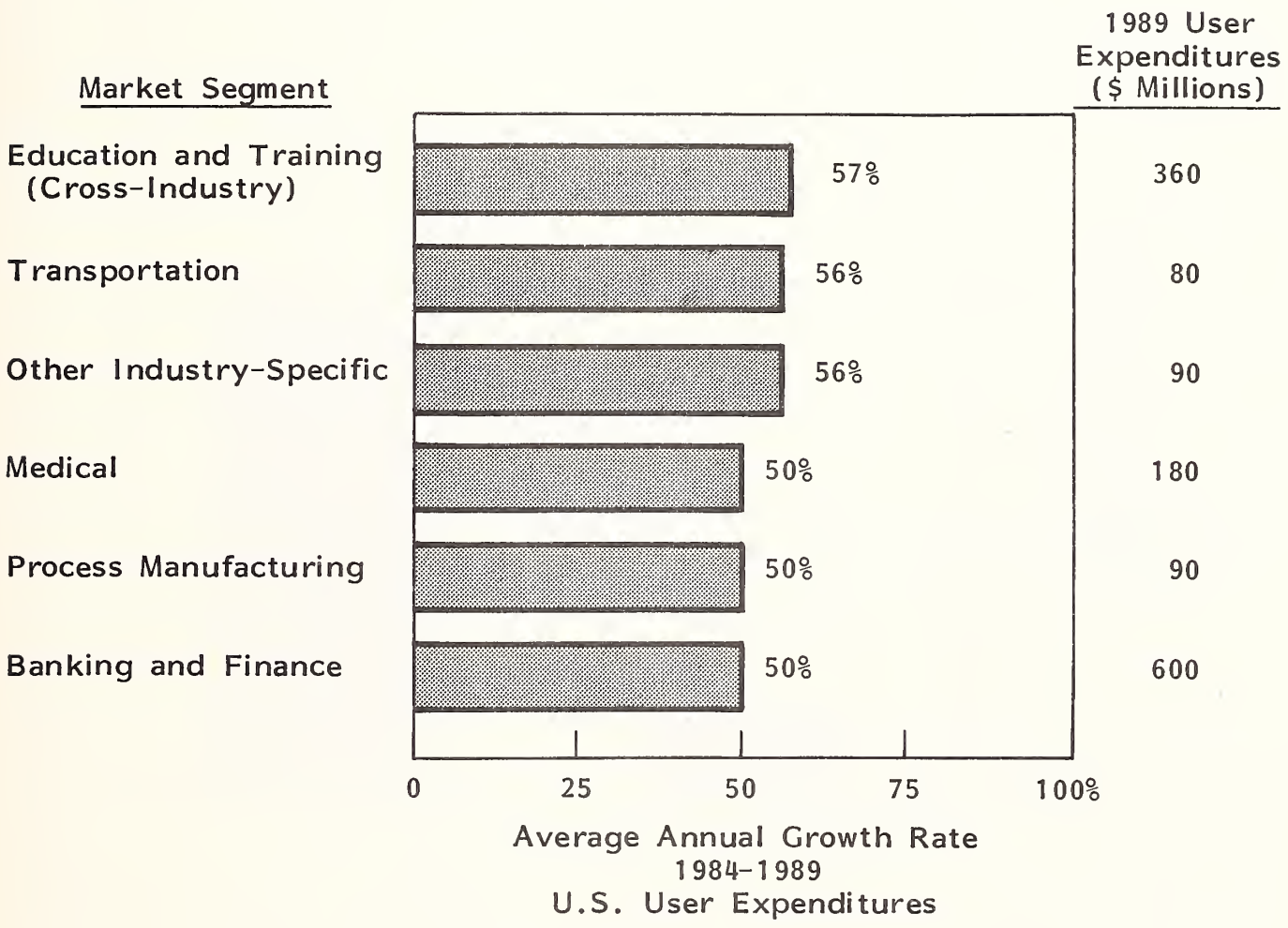
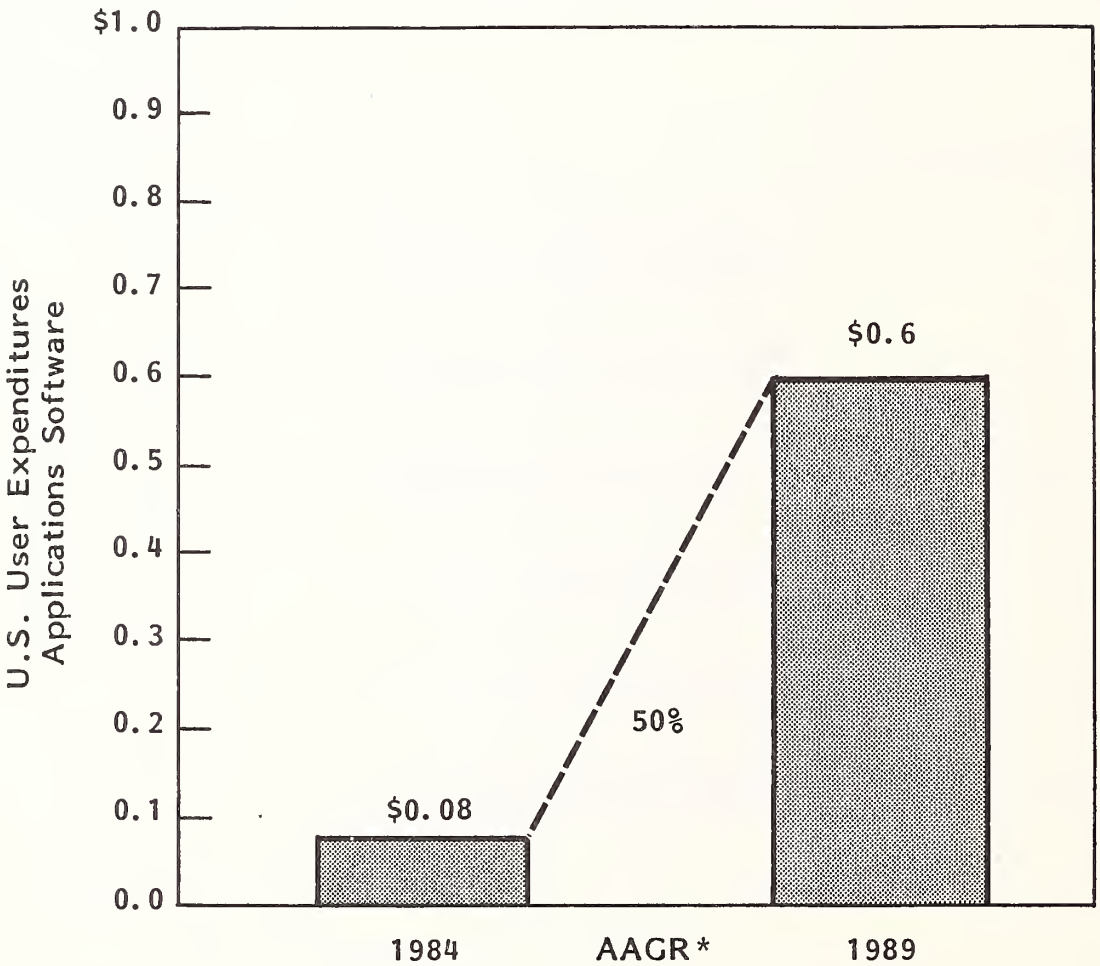


EXHIBIT IV-13

BANKING AND FINANCE
MICRO APPLICATIONS SOFTWARE MARKET, 1984-1989
(Industry-Specific) ($ Billions)



	Micro Applications Software 1989 Market†	
	Industry-Specific Only	All Applications Software
Size (Rank)	1 (10)	3 (16)
Growth Rate Rank	3 (10)	4 (16)

*Average Annual Growth Rate

†Parenthesis shows the number of segments ranked.

- Ease of product line expansion: an abundance of large, well-established mainframe software vendors are nicely positioned to broaden their product line to include cost-effective micro solutions.

- Vendors active in industry-specific micro software for banking and finance include:

  - Aurora Systems, Inc.

  - Comshare.

  - Executec Corporation.

  - Financial Systems, Inc.

  - Summit Information Systems.

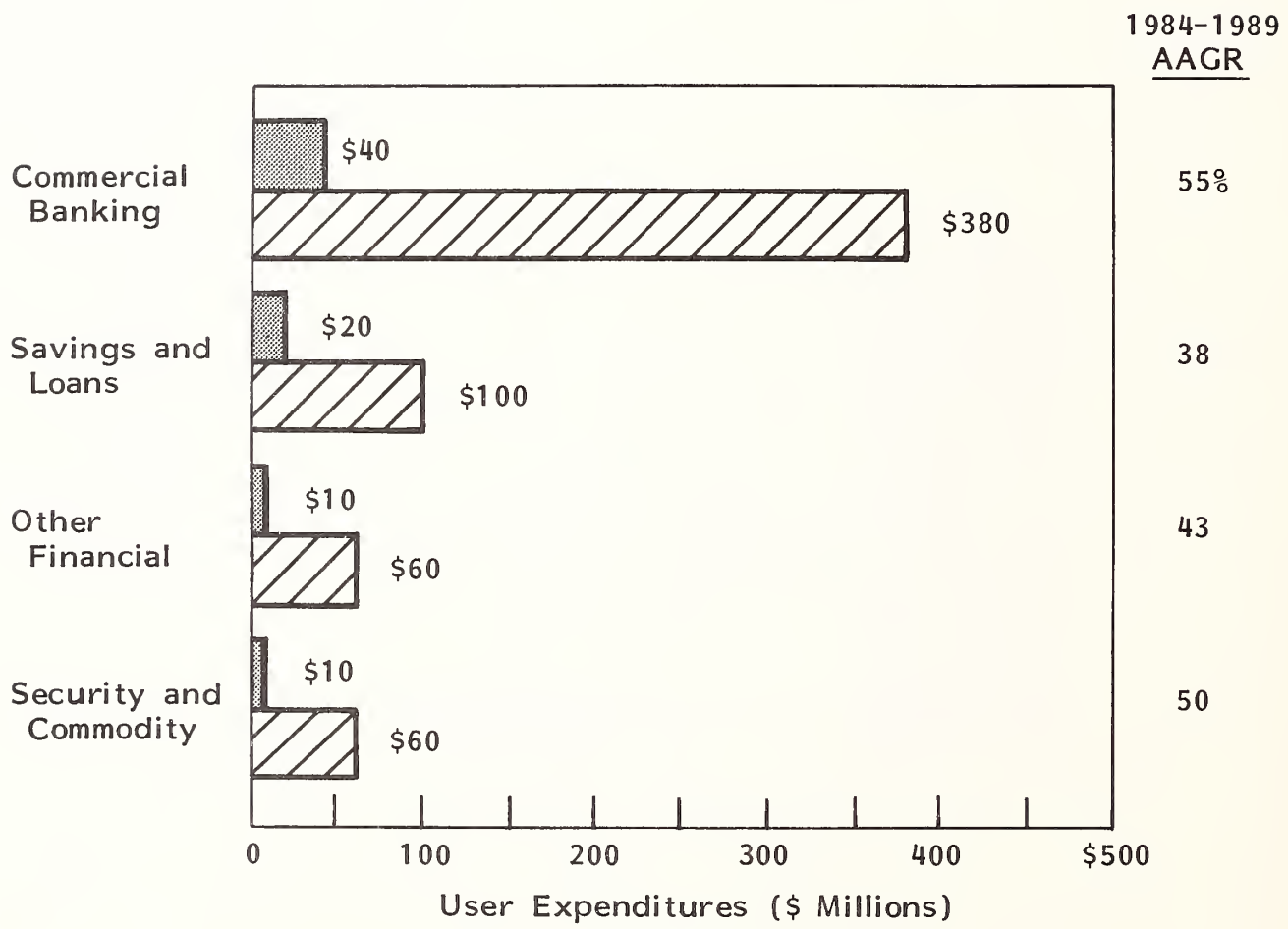
- Commercial banking provides both the largest and the fastest growing banking and finance sector opportunity. The 1984 base of $40 million will grow to $380 million by 1989, a 55% annual increase, as shown in Exhibit IV-14.

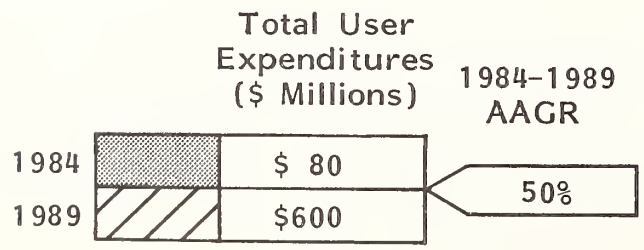
- However, micro software represents only 8% of all software products expenditures in 1984 in this sector. This is half or less of the penetration experienced in the other three sectors. Much of this difference is due to the heavy acquisition activity expected in mainframe transaction-oriented systems as commercial banks become especially aggressive in pursuing deregulation opportunities.

- Micro software penetration of the security and commodity sector at 20% for 1984 is the highest of the four. This reflects the orientation of this sector toward on-line data base access made increasingly useful via micro-based workstations.

EXHIBIT IV-14

BANKING AND FINANCE MICRO APPLICATIONS SOFTWARE
MARKET BY SECTOR, 1984-1989
(Industry-Specific)





c. Discrete Manufacturing

- Discrete manufacturing is a major industry-specific market for micro software. As shown on Exhibit IV-15, this segment is the third largest and third fastest growing of the industry-specific markets.

- User expenditures will grow 47% annually from a 1984 base of $40 million to a 1989 market size of $260 million. INPUT believes that micros will play an important role in discrete manufacturing during the next few years for the following reasons:

  - They can be excellent and versatile data collection devices.

  - For smaller operations they make the automation process less onerous by enabling the "one step at a time" approach to be taken.

  - Via the micro-mainframe link, personal computers can bring portions of large-systems capability down to the end user.

- One factor that is slowing micro software growth in the discrete manufacturing sector is information systems management's relatively apathetic attitude toward end-user computing. INPUT's mid-1984 survey showed these managers rank this issue lower than over half of the other industry sectors surveyed.

- Vendors active in industry-specific micro software for discrete manufacturing include:

  - Helmsman Systems, Inc.

  - Micro Manufacturing Systems.

  - MDM Systems, Inc.

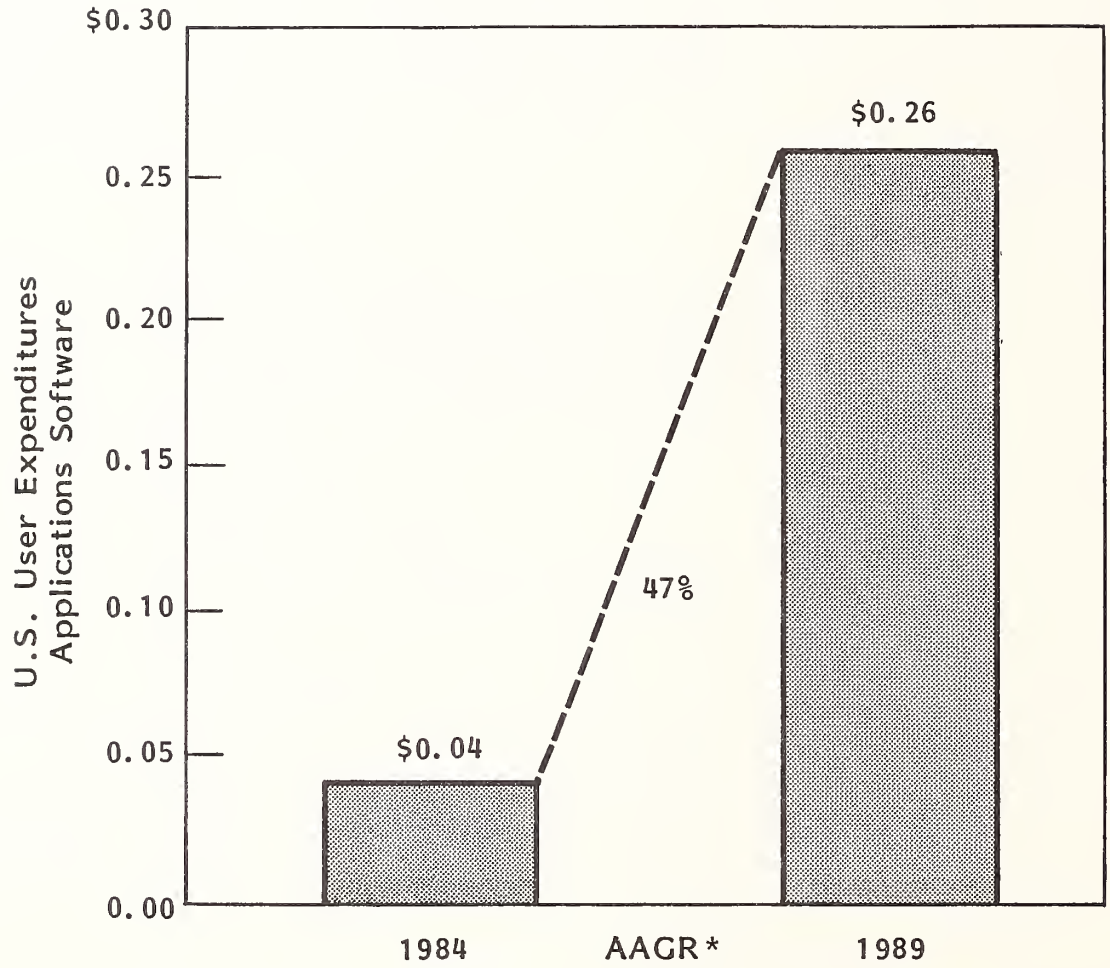
  - Micro-MRP, Inc.

EXHIBIT IV-15

DISCRETE MANUFACTURING

MICRO APPLICATIONS SOFTWARE MARKET, 1984-1989

(Industry-Specific) ($ Billions)



	Micro Applications Software 1989 Market†	
	Industry-Specific Only	All Applications Software
Size (Rank)	3 (10)	7 (16)
Growth Rate Rank	7 (10)	8 (16)

*Average Annual Growth Rate

†Parenthesis shows the number of segments ranked.

d. Distribution

- The distribution segment, which comprises the retail and wholesale sectors, is the second largest industry-specific market for micro software, as shown in Exhibit IV-16. The entire distribution market at $310 million for 1989 is slightly more than one-half the size of the banking and finance segment.

- Micro software penetration of the total software products market (12% for 1984 and 17% for 1989) for distribution organization is near the average for all industries.

- The growth of the micro software market for the retail and wholesale sectors is very similar, as illustrated in Exhibit IV-17. Retail will grow from a $20 million base in 1984 to $140 million by 1989, a 50% annual average increase. Wholesale rises to $170 million by 1989 from a $30 million base in 1984, a 44% average annual growth.

- The growth of micro software expenditures is being stimulated by such factors as:

  - POS systems acceptance, and their evolution to portable data collection.

  - Increasing implementation of electronic data interchange between geographically diverse business units.

- Vendors offering industry-specific micro software to the distribution industry include:

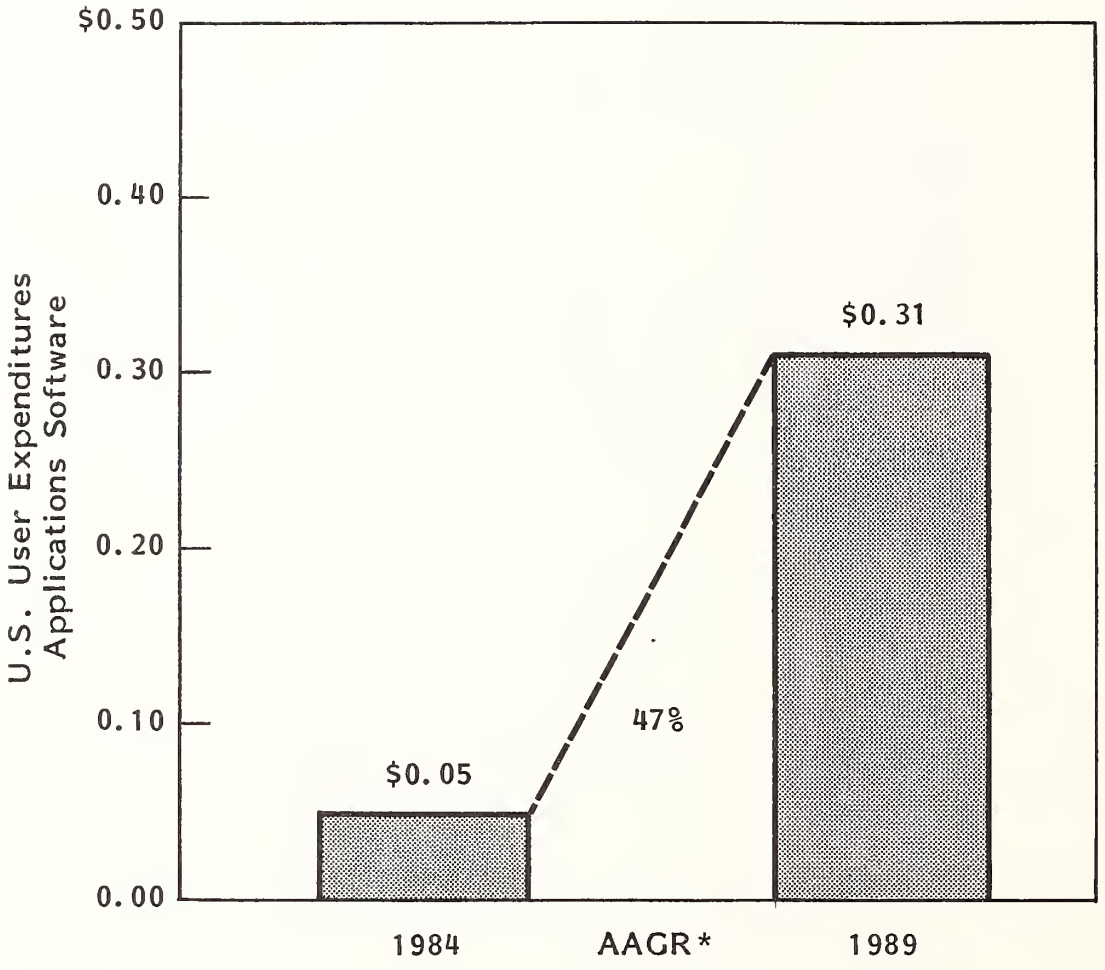
  - For wholesalers:

    . International Micro Systems.

    . Morgan Computing Company.

EXHIBIT IV-16

DISTRIBUTION INDUSTRY MICRO APPLICATIONS SOFTWARE MARKET, 1984-1989
(Industry-Specific) ($ Billions)



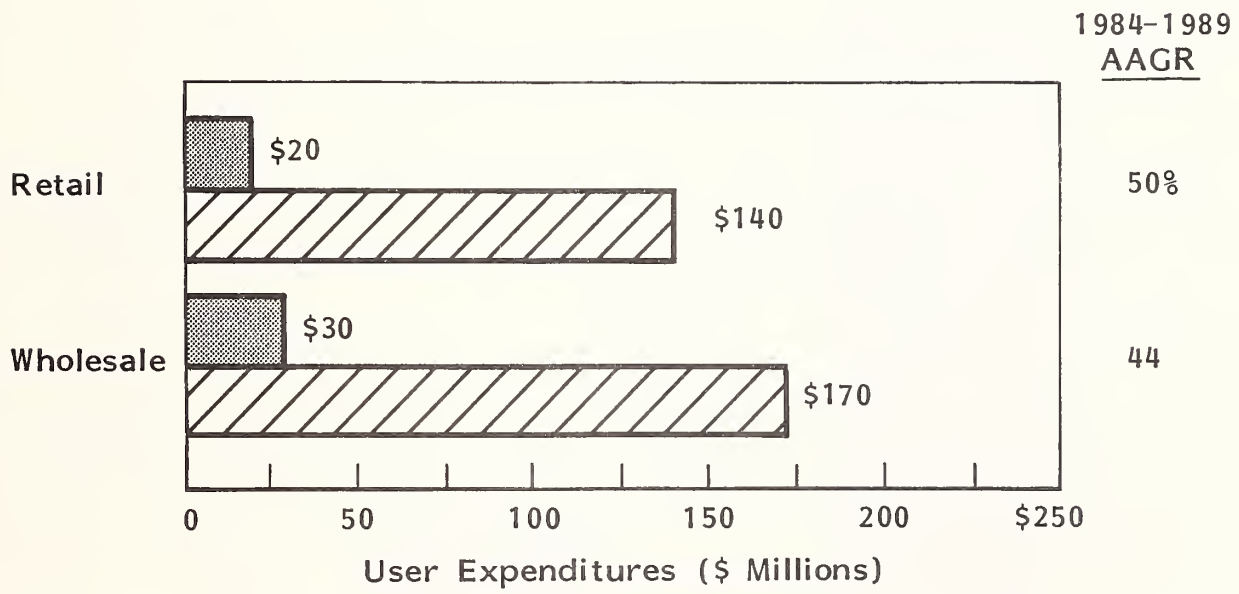
	Micro Applications Software 1989 Market†	
	Industry-Specific Only	All Applications Software
Size (Rank)	2 (10)	6 (16)
Growth Rate Rank	7 (10)	8 (16)

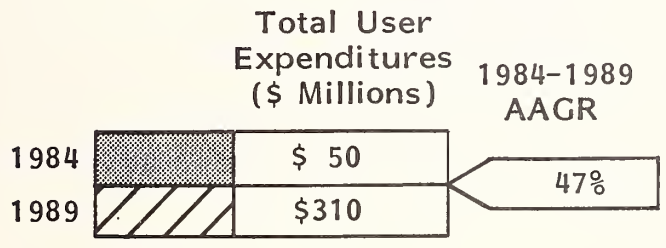
*Average Annual Growth Rate

†Parenthesis shows the number of segments ranked.

EXHIBIT IV-17

DISTRIBUTION INDUSTRY MICRO APPLICATIONS SOFTWARE
MARKET BY SECTOR, 1984-1989
(Industry-Specific)





- For retailers:

  . Computer Systems Corporation.

  . Data Consulting Group.

  . Intelligent Software Systems.

e. Education

- Micro software for educational institution usage is included in this section. Both academic and administrative applications are covered.

- Micro software purchased by noneducational organizations (e.g., corporations) is classified as "cross-industry education and training" and has already been discussed (Chapter IV, Section B.1.)

- Although the micro software component of the education/industry-specific market is one of the smallest and slowest growing of all of the market segments analyzed, nevertheless user expenditures will almost quadruple to $80 million between 1984 and 1989, as shown in Exhibit IV-18.

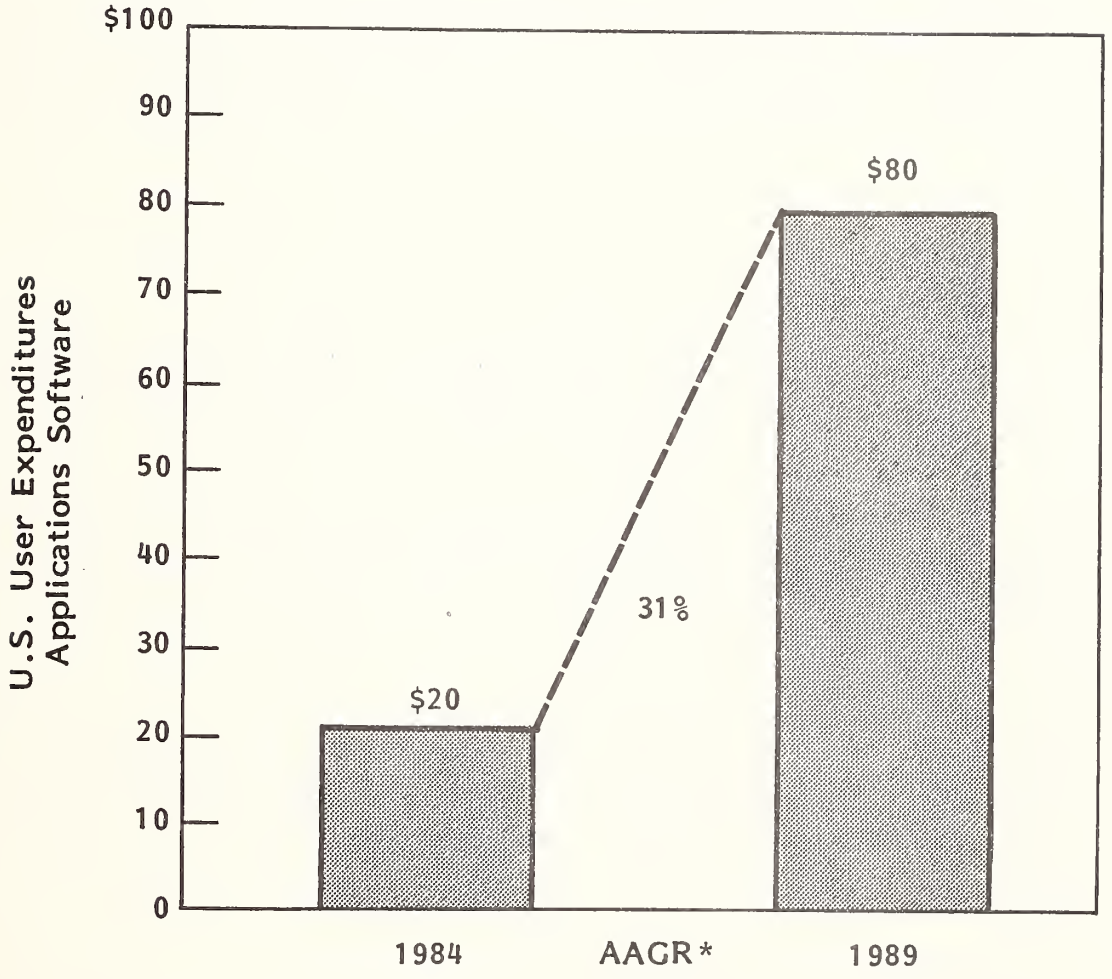
- Micro software penetration of the total software products education market is the highest of all market segments analyzed. The micro share increases from 54% in 1984 to 64% by 1989. The micro software market will benefit from the bonanza of PC hardware which vendors are pumping into educational institutions of all types.

  - PC units in primary and secondary schools will expand to 600,000 in 1984, double that of 1983.

  - Universities have close to 300,000 units installed.

EXHIBIT IV-18

EDUCATION
MICRO APPLICATIONS SOFTWARE MARKET, 1984-1989
(Industry-Specific) ($ Millions)



	Micro Applications Software 1989 Market†	
	Industry-Specific Only	All Applications Software
Size (Rank)	8 (10)	14 (16)
Growth Rate Rank	10 (10)	14 (16)

*Average Annual Growth Rate

†Parenthesis shows the number of segments ranked.

- The explosion of PC installations does not mean that budgets are not a problem. Many of these hardware units have been acquired at significant discounts from vendors anxious for the visibility, prestige and the chance to shape young minds.

- However, the presence of such machines stimulates micro software demand. The challenge for vendors is to devise pricing and distribution policies that can meet the unique requirements of low budget, high need, and high visibility.

f. Insurance

- Insurance industry-specific micro software will increase from $40 million in 1984 to $190 million in 1989, an average annual growth rate of 39%.

- As can be seen on Exhibit IV-19, the insurance segment resides close to the midpoint of all segments in terms of market size, and toward the bottom in terms of growth rate.

- Exhibit IV-20 shows a comparison between the three insurance sectors in terms of micro software size and growth. Life insurance represents a market that is double that of property and casualty, although the growth rates are comparable.

- Micro software offerings will benefit significantly from the major emphasis on agent automation that is currently underway. Offerings are being provided to agents from:

  - Major insurance companies.

  - Joint venture endeavors.

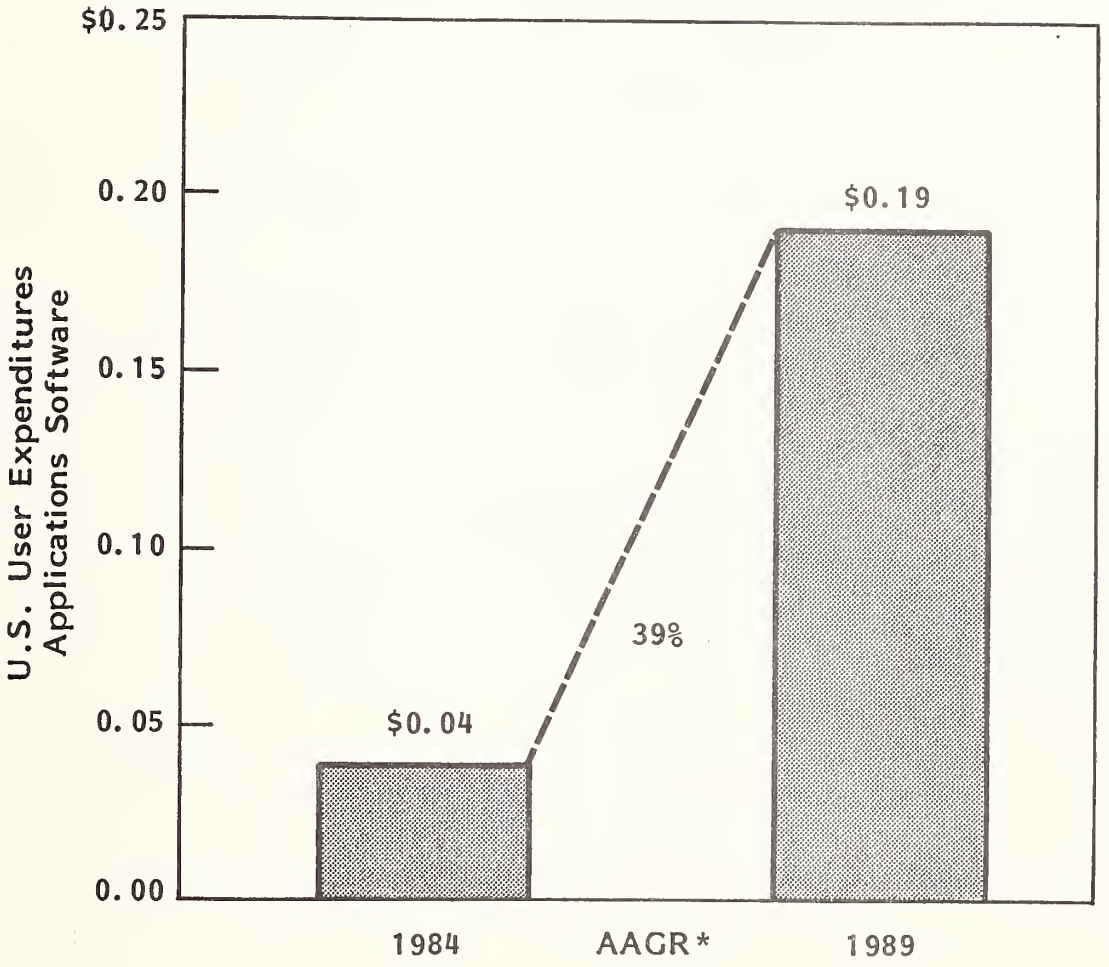
  - Independent vendors.

EXHIBIT IV-19

INSURANCE

MICRO APPLICATIONS SOFTWARE MARKET, 1984-1989

(Industry-Specific) ($ Billions)



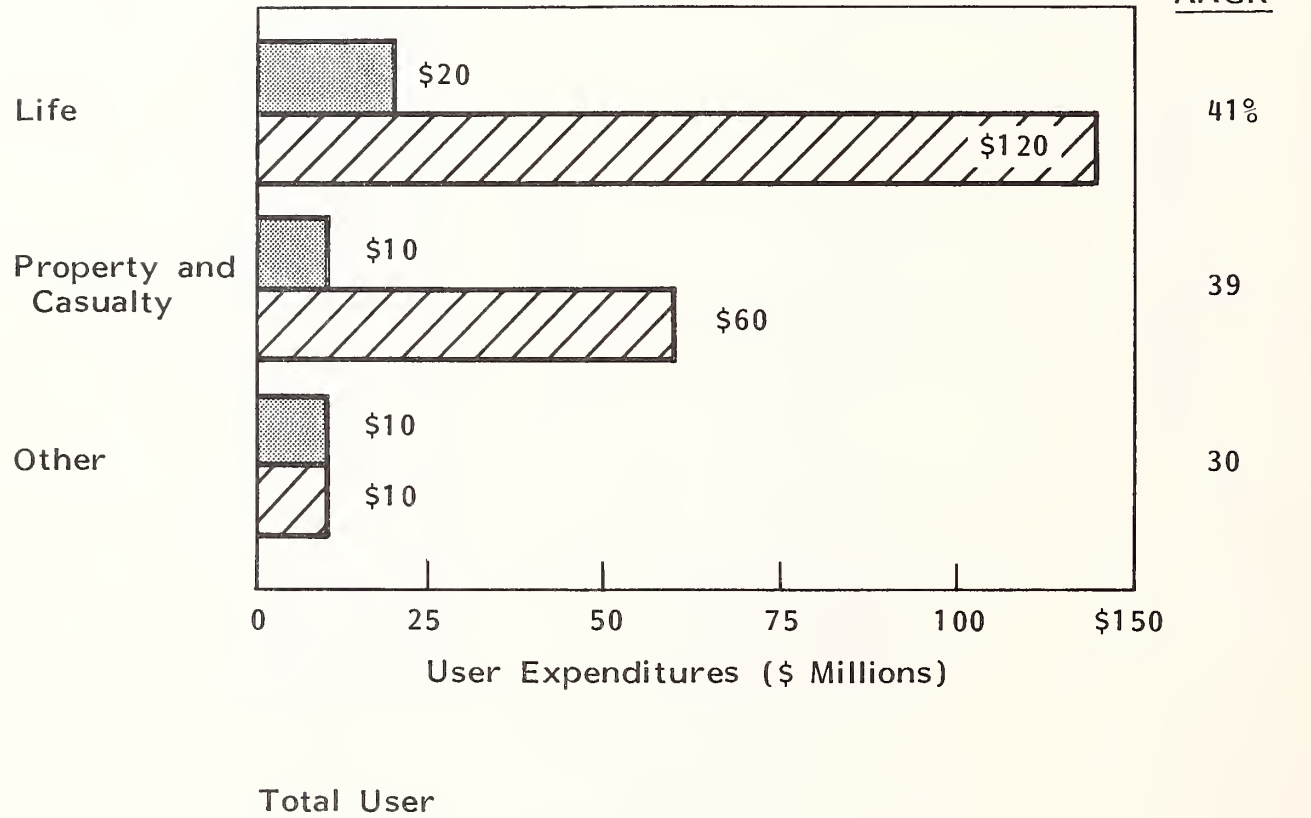
	Micro Applications Software 1989 Market†	
	Industry-Specific Only	All Applications Software
Size (Rank)	4 (10)	8 (16)
Growth Rate Rank	9 (10)	12 (16)

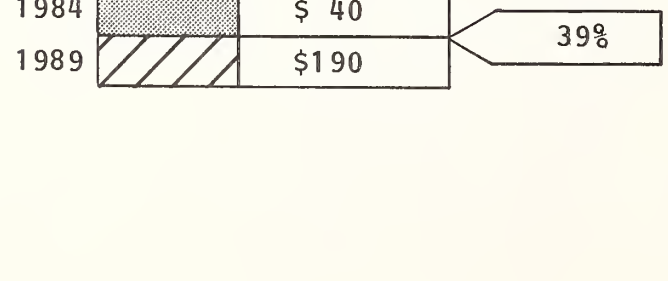
*Average Annual Growth Rate

†Parenthesis shows the number of segments ranked.

EXHIBIT IV-20

INSURANCE MICRO APPLICATIONS SOFTWARE
MARKET BY SECTOR, 1984-1989
(Industry-Specific)





- In addition, the major insurance companies are giving high priority to end-user computing needs of their home office employees.

- Vendors offering industry-specific micro software products to the insurance market include:

  - AMS.

  - Delphi Systems.

  - Informatics General (The Top Producer).

g. Medical

- The medical segment is embracing micro software solutions faster than most other industries. As shown in Exhibit IV-21, the 1984 base of $20 million will increase 50% annually to become $180 million by 1989.

- Penetration of the total software market will increase from 10% in 1984 to 15% five years later.

- Exhibit IV-22 shows that both hospitals and physicians/other sectors will see a ninefold increase to $90 million by the end of the decade.

- INPUT's annual survey of information systems managers shows that hospitals' interest in end-user computing is greater than 65% of all other industries surveyed. As hospitals undergo the travail of government-imposed Diagnostic-Related Group (DRG) practices, new systems with micro functionality will emerge as matters of necessity.

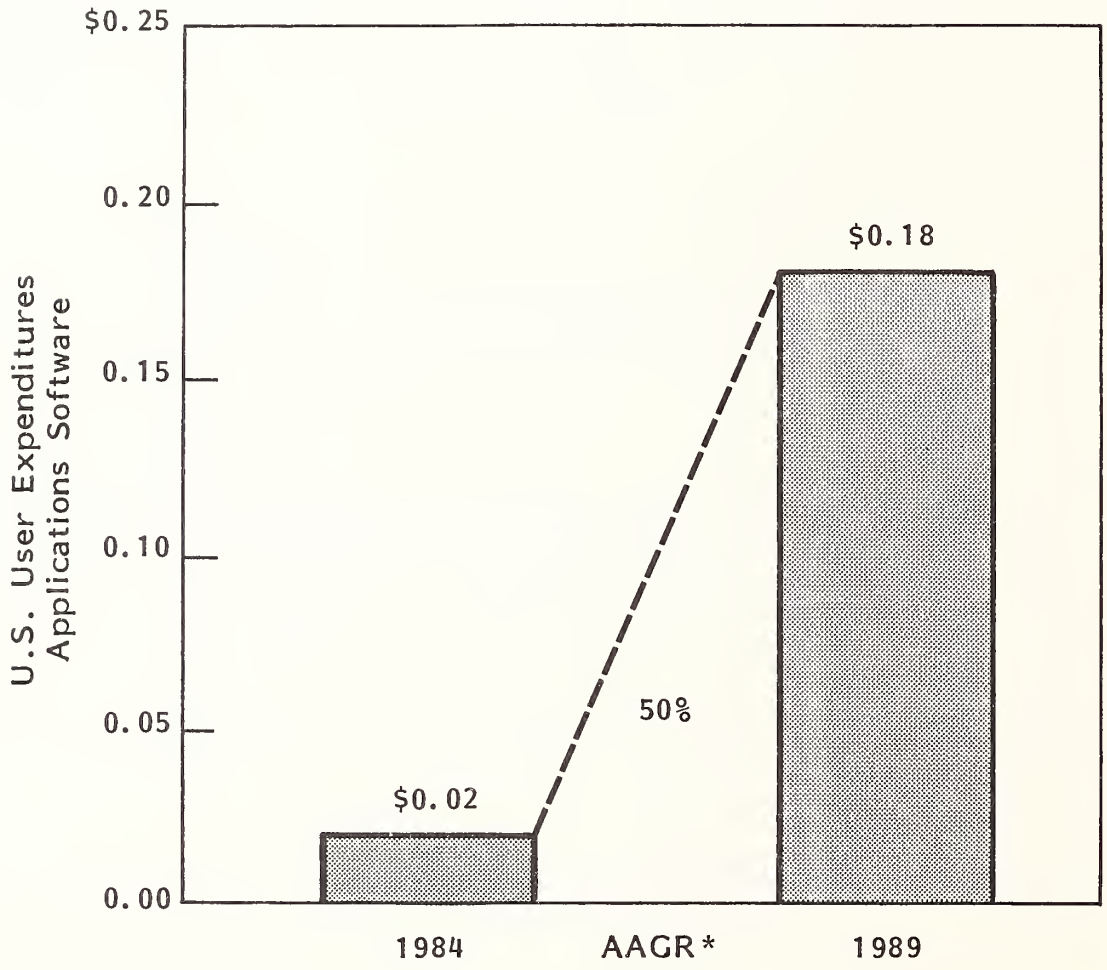
- Vendors actively marketing micro software specifically for the medical segment include:

EXHIBIT IV-21

MEDICAL

MICRO APPLICATIONS SOFTWARE MARKET, 1984-1989

($ Billions)



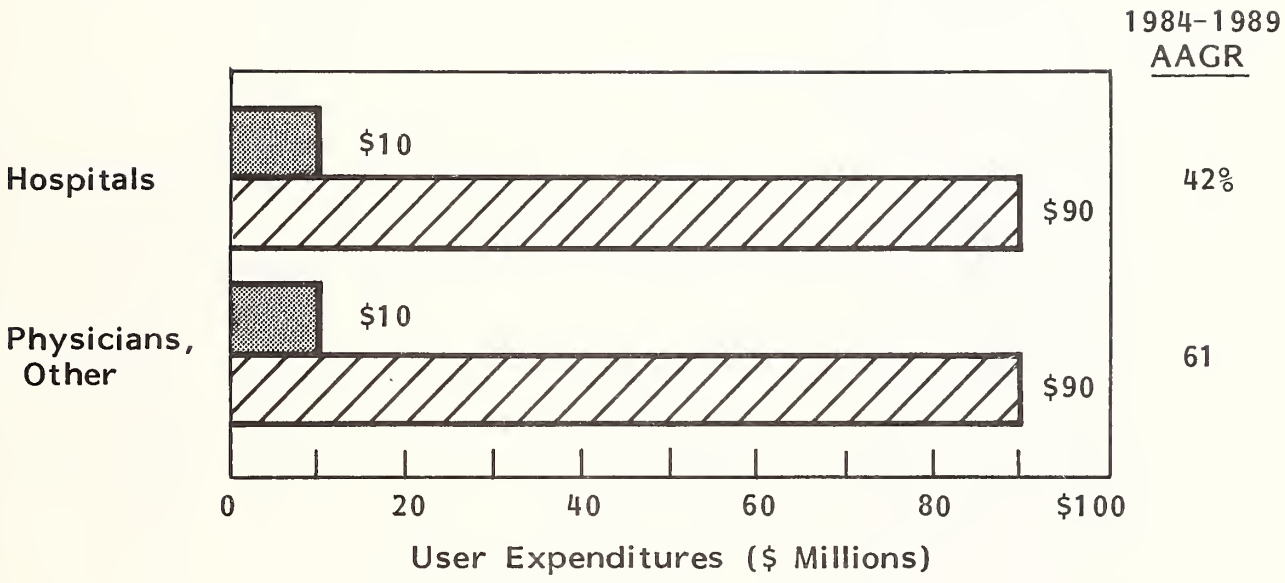
	Micro Applications Software 1989 Market†	
	Industry-Specific Only	All Applications Software
Size (Rank)	5 (10)	9 (16)
Growth Rate Rank	3 (10)	4 (16)

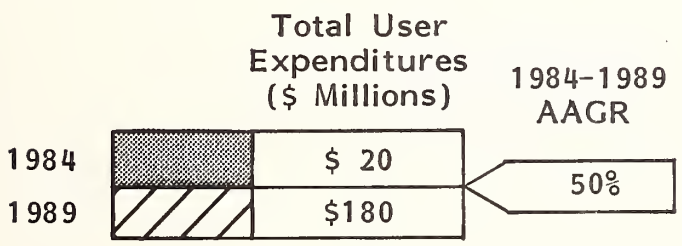
*Average Annual Growth Rate

†Parenthesis shows the number of segments ranked.

EXHIBIT IV-22

MEDICAL MICRO APPLICATIONS SOFTWARE
MARKET BY SECTOR, 1984-1989
(Industry-Specific)





- Articulate Publications, Inc.

- Digital Marketing Corporation.

- Physicians Practice Management, Inc.

- Systems Plus, Inc.

h. Process Manufacturing

- Although micro software will remain less than 15% of all software expenditures by process manufacturers during the 1984-1989 time period, the micro market itself is growing at a healthy 50% per year to become $90 million by 1989, as shown in Exhibit IV-23.

- This places micro process manufacturing software in the upper quarter of growth markets analyzed for this report.

- Market opportunities, in order of attractiveness, are:

  - Process control.

  - Shipping control.

  - Raw material analysis.

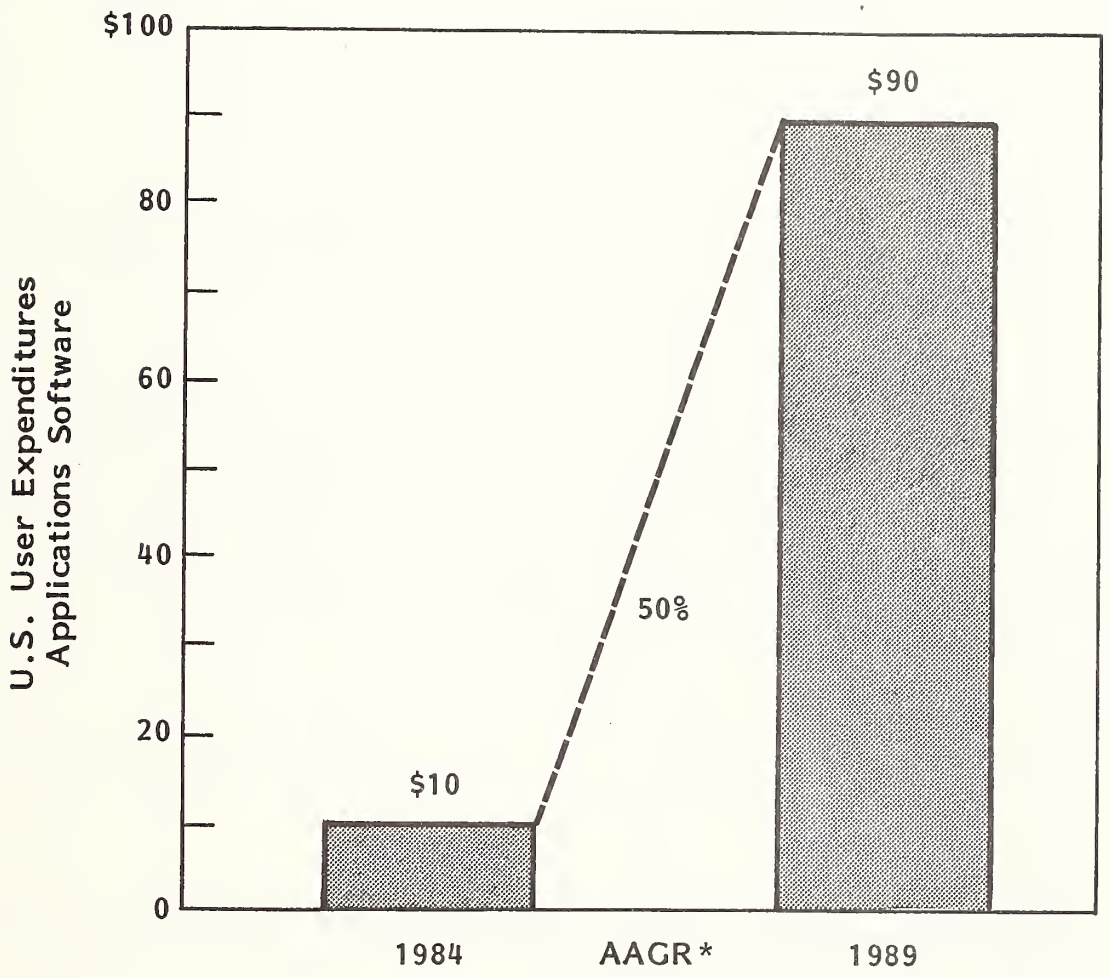
  - Exploration analysis.

- Vendors providing micro software for process manufacturing-specific applications include:

  - Kelix Software Systems.

EXHIBIT IV-23

PROCESS MANUFACTURING
MICRO APPLICATIONS SOFTWARE MARKET, 1984-1989
(Industry-Specific) ($ Millions)



	Micro Applications Software 1989 Market†	
	Industry-Specific Only	All Applications Software
Size (Rank)	7 (10)	12 (16)
Growth Rate Rank	3 (10)	4 (16)

*Average Annual Growth Rate

†Parenthesis shows the number of segments ranked.

- Norman Alterman Company.

- The Small Computer Company.

- Universal Micro Systems.

i. Service and "Other Industries"

- The services and "other industries" market segment is a collection of diverse businesses ranging from accountants and lawyers to hotels, real estate, repair services and membership organizations.

- The micro software market for services and "other industries" is one of the fastest growing in the economy, although it is near the lower third in terms of absolute size of all the markets covered in this report. User expenditures will reach $160 million by 1989 as a result of a 52% annual growth from a 1984 base of $20 million, as shown in Exhibit IV-24.

- The micro software share of the total software products marketplace will almost double in the next five years to 19%, from the current level of 11%.

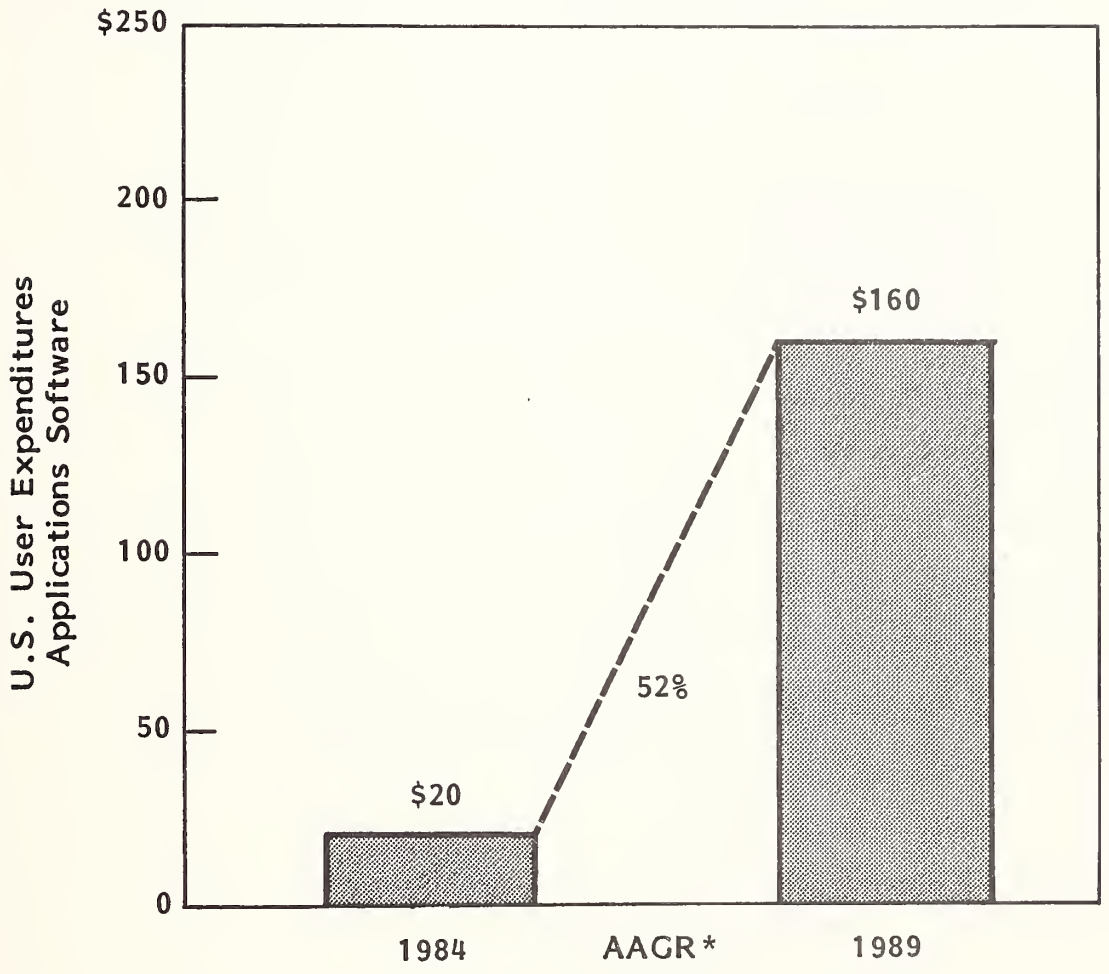
- Because most of the firms in this segment are small, they are especially receptive to micro-based solutions which increase internal productivity with minimum capital outlay. For example:

  - Legal firms are seeking solutions that enhance productivity of a labor-intensive business. The emergence of prepaid legal services plans provides new opportunities for micro software to reduce administrative chores.

  - Accountants are receptive to micro-based tax packages that offload more expensive remote computing services.

EXHIBIT IV-24

SERVICES AND "OTHER INDUSTRIES"
MICRO APPLICATIONS SOFTWARE MARKET, 1984-1989
($ Millions)



* Average Annual Growth Rate

- Hotels and other lodging firms are becoming especially aggressive in installing on-site property management systems to improve productivity and customer services.

- Vendors offering industry-specific micro software to this segment include:

  - Architecture firms.

    . Disco-Tech.

    . Tectonic Systems Corporation.

  - Law firms.

    . Advanced Legal Software.

    . Micro Craft, Inc.

    . Professional Computer Services, Inc.

  - Real estate firms.

    . Automated Analysis.

    . Technical Computer Services, Inc.

    . Westico, Inc.

j. Transportation

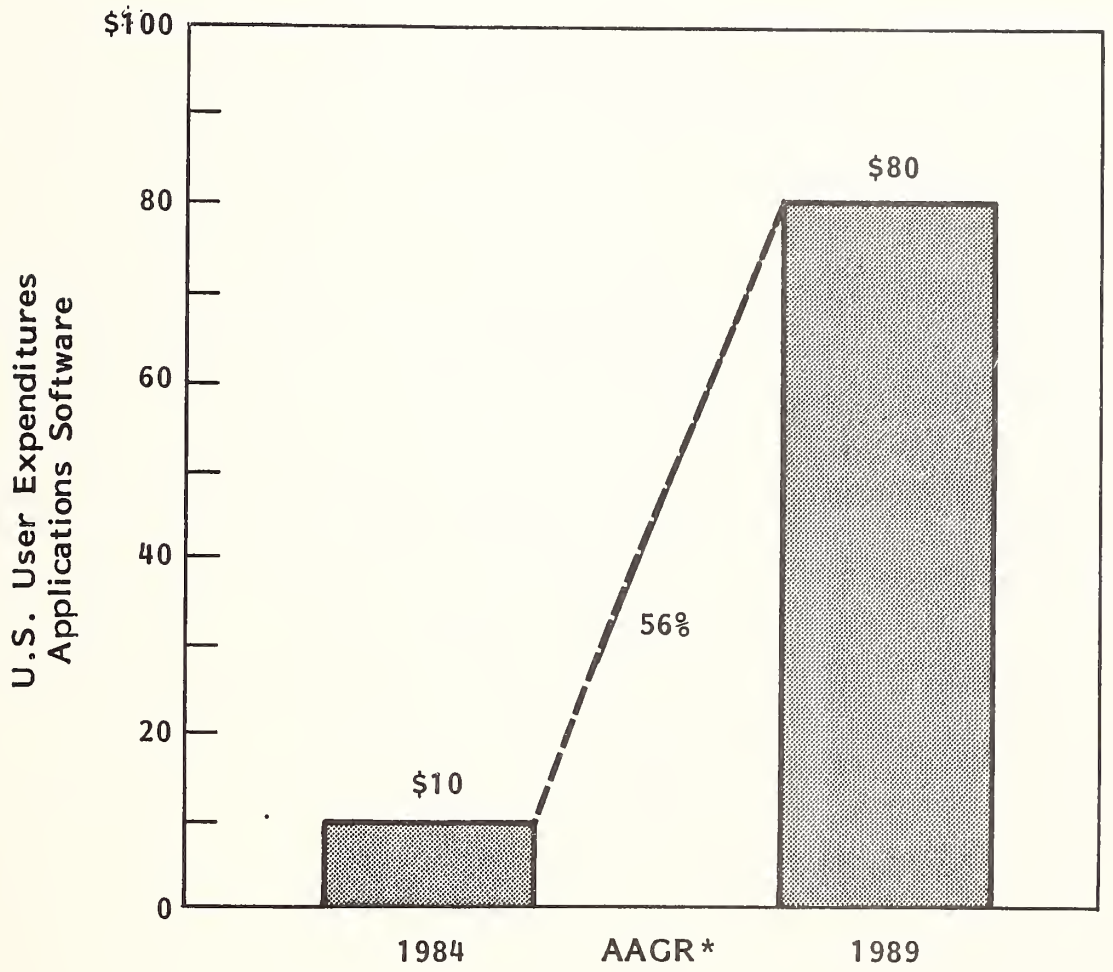
- Micro software for transportation firms is the fastest growing industry-specific market profiled in this report. As shown in Exhibit IV-25, user

EXHIBIT IV-25

TRANSPORTATION

MICRO APPLICATIONS SOFTWARE MARKET, 1984-1989

($ Millions)



	Micro Applications Software 1989 Market†	
	Industry-Specific Only	All Applications Software
Size (Rank)	9 (10)	15 (16)
Growth Rate Rank	1 (10)	2 (16)

*Average Annual Growth Rate

†Parenthesis shows the number of segments ranked.

expenditures will increase 56% to reach $80 million by 1989 from a base of $10 million in 1984.

- Micro software penetration of the total software products market will go from a 1984 level of 8% to 12% by 1989.

- Deregulation of this industry is rendering existing systems rapidly obsolete and thus creating multiple opportunities for new systems approaches. End-user computing concerns have a higher priority in this industry than any other surveyed by INPUT.

- Application opportunities abound, especially related to such areas as inter-modal transportation. Applications of high interest include cargo tracking, tariff tracking, billing and labor reporting.

- Vendors currently offering industry-specific packages to transportation firms include:

  - Nuevo Tech, Inc.

  - Pro Computer Centers.

  - Southwest Systems.

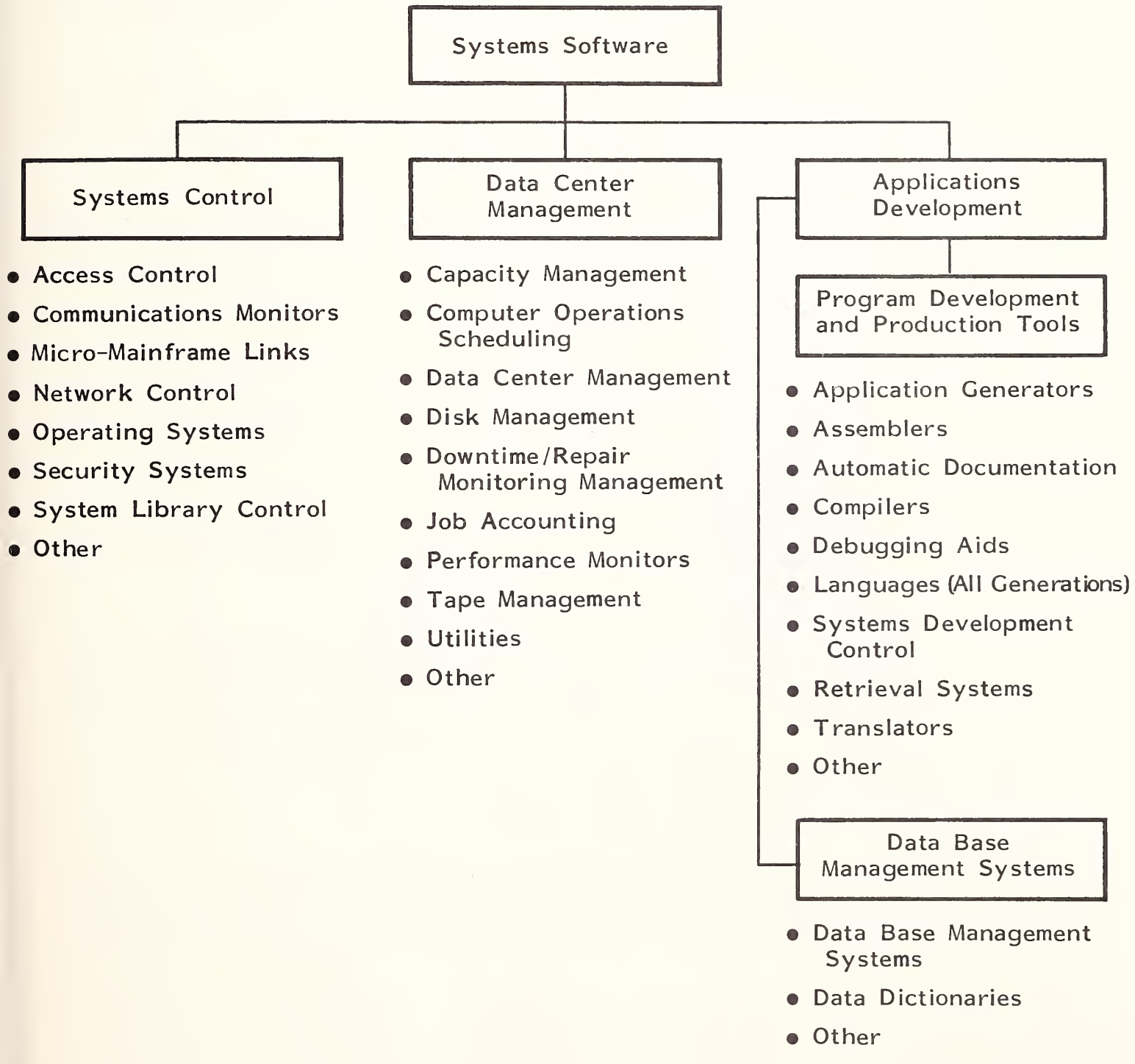
C. SYSTEMS SOFTWARE FORECASTS AND ANALYSIS

1. OVERVIEW

- Systems software is used to control computers, develop applications and/or to manage operations associated with computers, as shown in Exhibit IV-26.

EXHIBIT IV-26

SYSTEMS SOFTWARE PRODUCTS
MARKET STRUCTURE



- The micro systems software marketplace will grow by an impressive 49% during the next five years. From a 1984 base of $600 million user expenditures will catapult to a $4.3 billion opportunity by 1989, as shown in Exhibit IV-27.

- Systems software share of the total micro software market is expanding from 36% to 41% in 1989, as shown in Exhibit IV-28.

- The dynamic growth of the systems software market during the next five years is the result of the following factors:

  - The micro hardware installed base will increase sixfold. Each unit must have some systems software to function minimally, and much systems software to function well.

  - Applications are becoming increasingly integrated, either horizontally (system-to-system) or vertically (micro-to-mainframe). This requires more systems software.

  - The emergence of a telecommunications-oriented world where distributed data processing will finally become a reality.

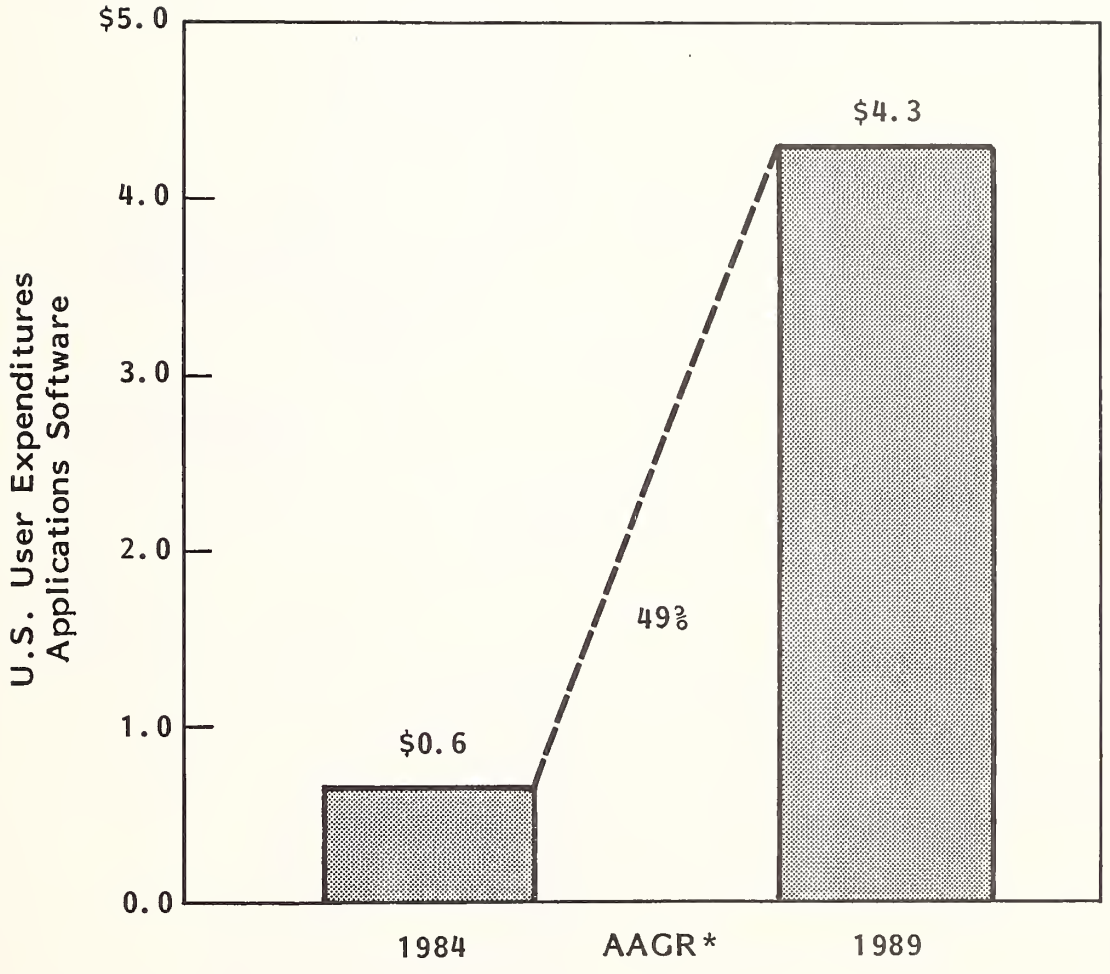
- Exhibit IV-29 shows the distribution of systems software growth among its three primary components: applications development tools, systems control and data center management. Each of these are profiled in the text below.

2. APPLICATIONS DEVELOPMENT TOOLS

- As shown in Exhibit IV-30, the applications development tools sector is by far the largest of the three micro software components of the systems software marketplace.

EXHIBIT IV-27

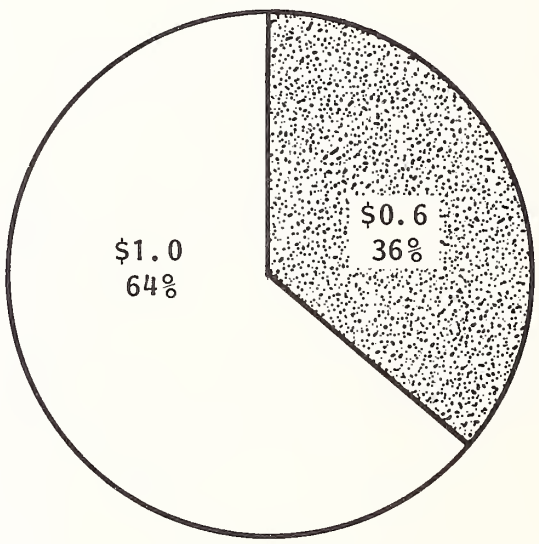
MICROCOMPUTER SYSTEMS
SOFTWARE MARKET, 1984-1989
($ Billions)



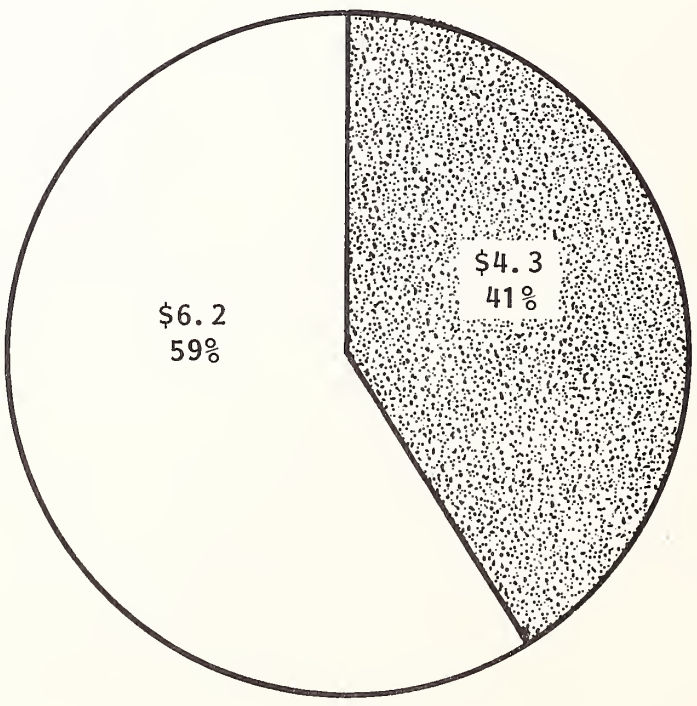
* Average Annual Growth Rate

EXHIBIT IV-28

MICRO SOFTWARE USER EXPENDITURES
BY TYPE OF SOFTWARE, 1984-1989
($ Billions)



1984
$1.6 Billion

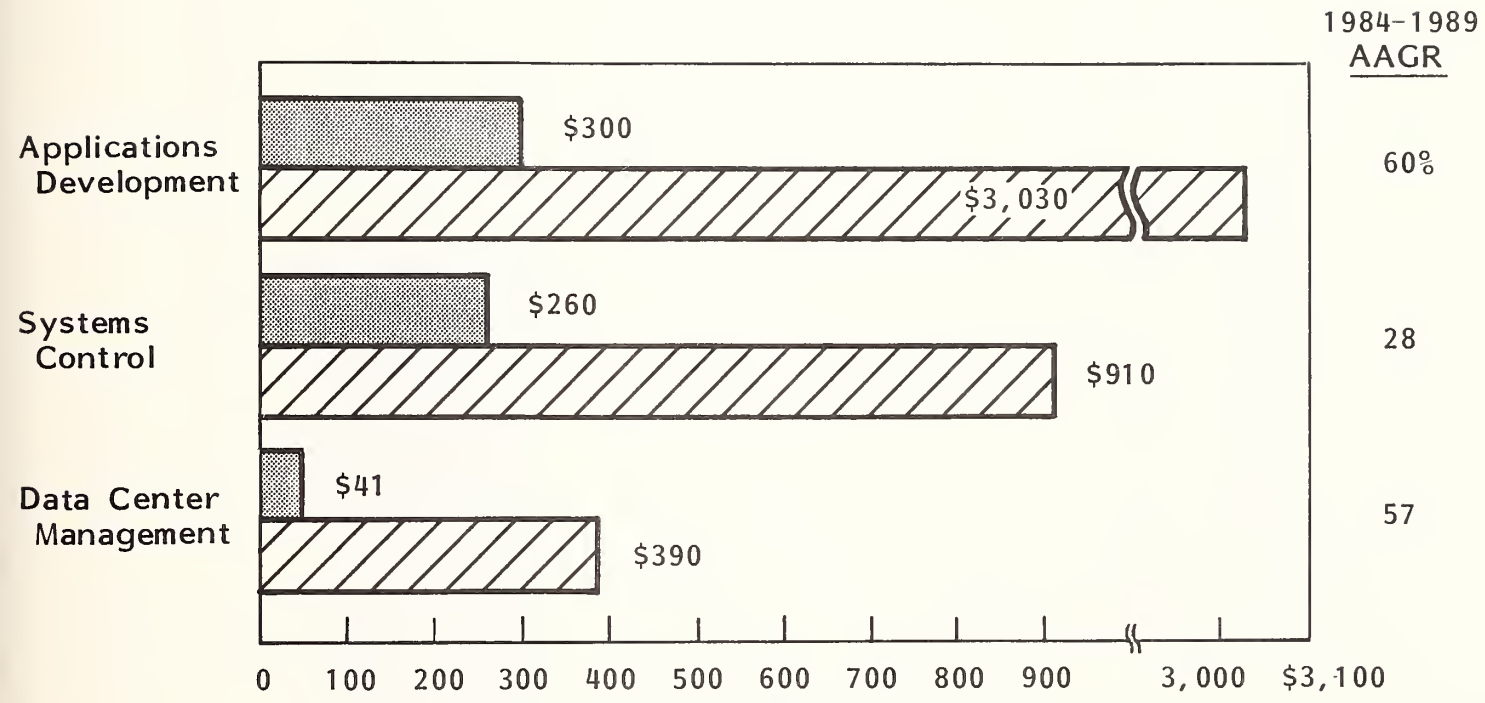


1989
$10.5 Billion

Applications
Systems

EXHIBIT IV-29

MICROCOMPUTER SYSTEMS SOFTWARE MARKET
BY SOFTWARE TYPE, 1984-1989



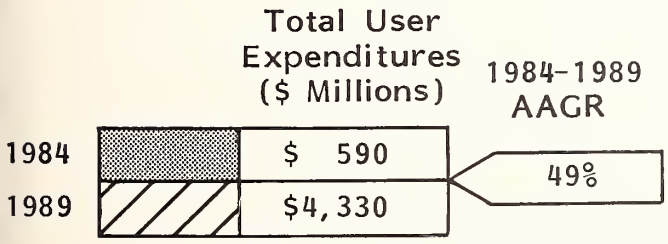
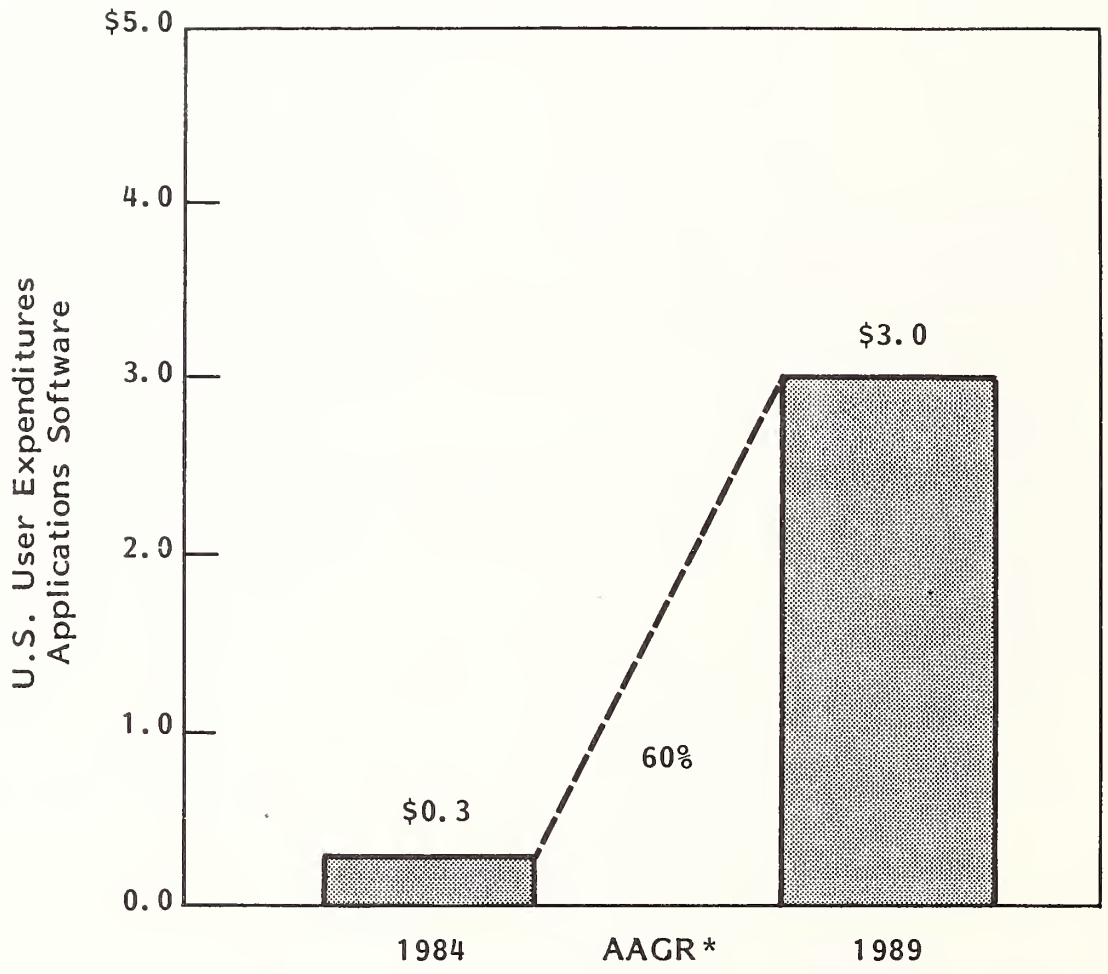


EXHIBIT IV-30

APPLICATIONS DEVELOPMENT TOOLS
MICRO SOFTWARE MARKET, 1984-1989
($ Billions)



* Average Annual Growth Rate

- From a base of $300 million in 1984, applications development tools will grow an impressive 60% annually to be a $3 billion opportunity by 1989.

- This market growth makes applications development tools by far the largest and the fastest growing portion of the entire micro-based systems (or applications) software marketplace.

- Factors contributing to this growth include:

  - Widespread end-user demands for tools that eliminate the need for reliance on data processing professionals. Thus markets are attractive for fourth-generation languages, end-user oriented data base management systems and application generators.

  - The evolution of DBMS into text- and image-processing systems. These capabilities open new markets far beyond the data-oriented areas of the past.

  - The incorporation of artificial intelligence technology into languages and retrieval tools. This results in the irresistible combination of increased power on the one hand and friendlier user interfaces on the other.

3. SYSTEMS CONTROL

- Systems control micro software includes operating systems, network control and security systems.

- Exhibit IV-31 shows the growth of this market from a base of $0.3 billion in 1984 to $0.9 billion by 1989 as a result of a 28% average annual growth rate.

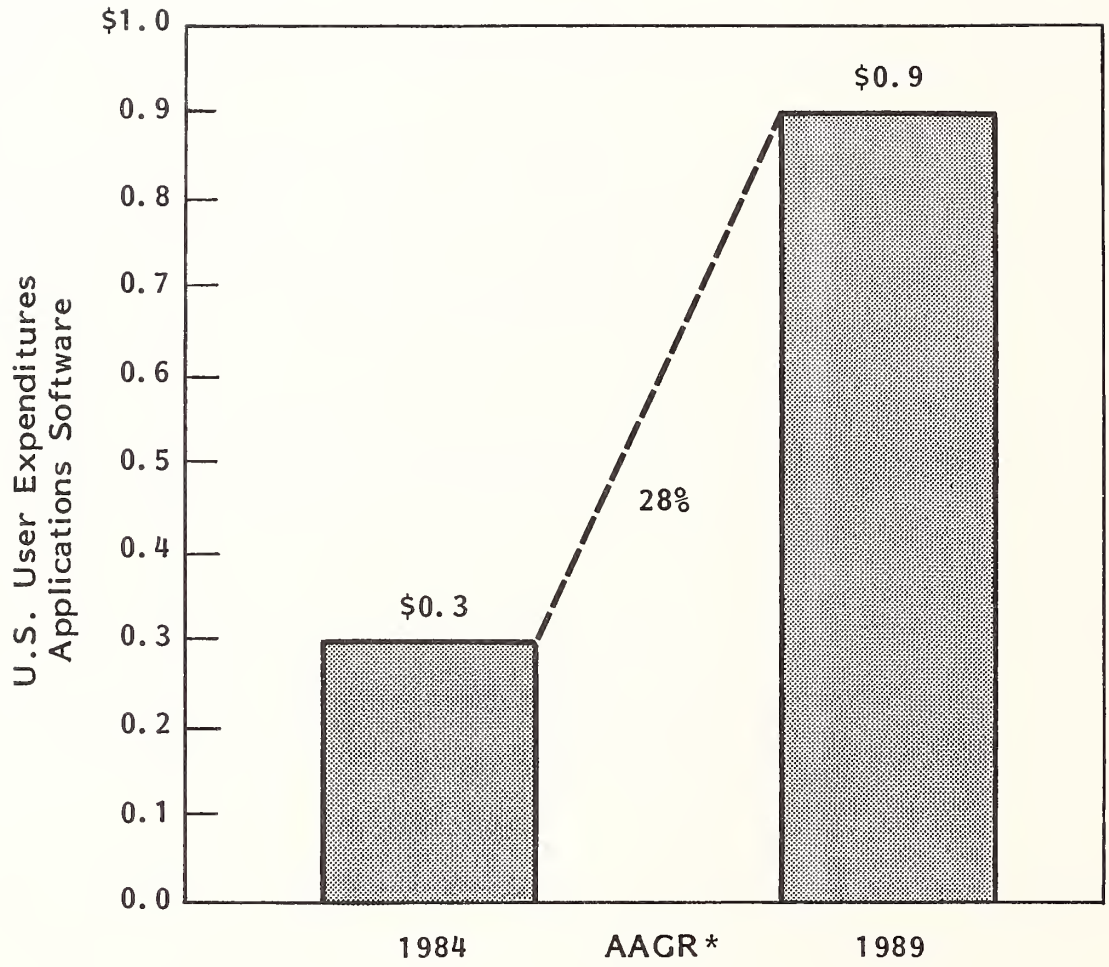
- A number of forces are impacting this market, both positively and negatively.

EXHIBIT IV-31

SYSTEMS CONTROL

MICRO SOFTWARE MARKET, 1984-1989

($ Billions)



* Average Annual Growth Rate

- Microcomputer systems-controlled software products will proliferate as the PC installed-hardware base increases from the 1983 base of 3.6 million to the 1989 base of 22 million. Many of these units will have multiple operating systems installed as users employ the micros as true multifunction workstations. These factors will help to boost systems control software volume.

- However, the unit price of systems control software, especially operating systems software, will continue to decline as multiple vendors battle for this "account control" weapon.

- Much of today's existing systems control software will become obsolete as operating systems expand their domain to encompass such functions as windows, more effective user interfaces, and micro-mainframe connections.

4. DATA CENTER MANAGEMENT

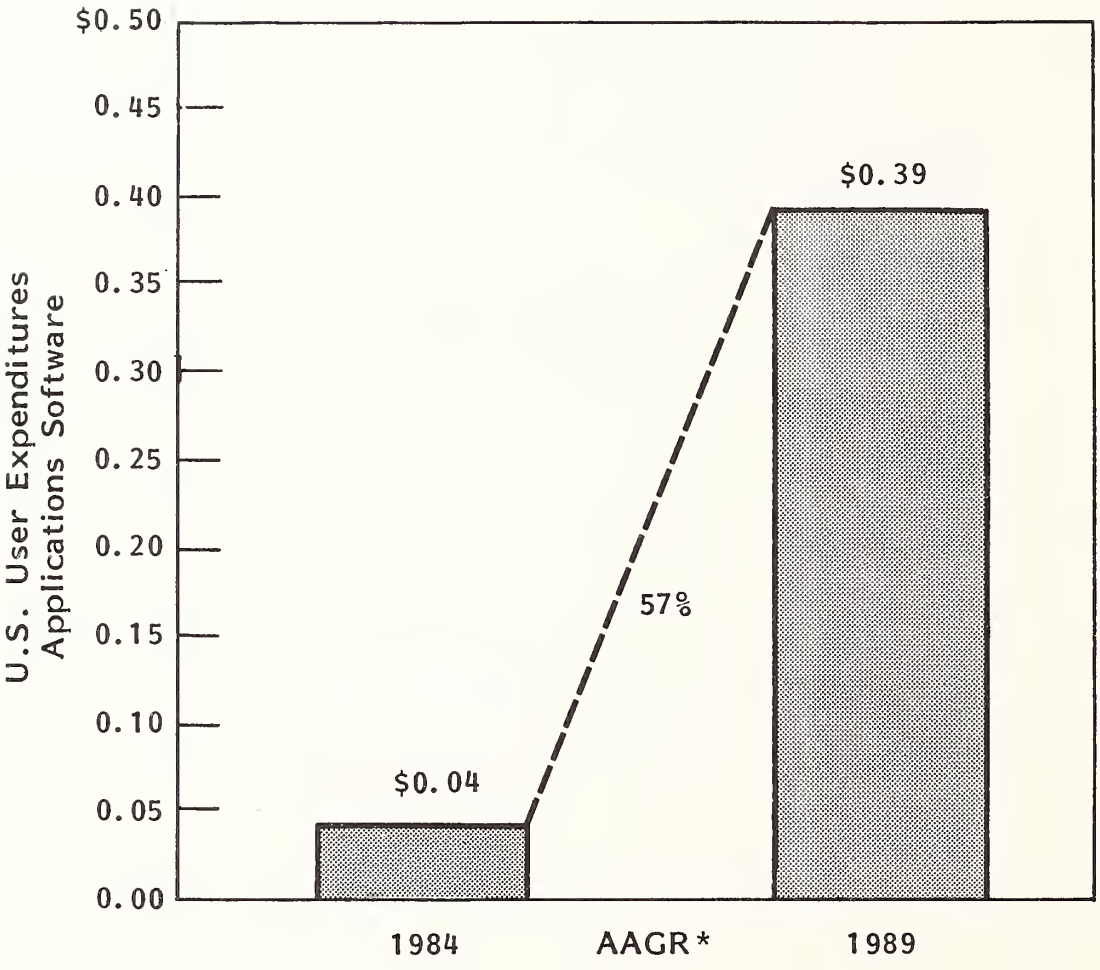
- Although the data center management market will grow 57% annually for the next five years, it remains a relatively small market. The 1984 base of $40 million will expand to $390 million by 1989, as shown in Exhibit IV-32.

- In contrast to the mainframe/mini world, where data centers are often large, complex organizations, the micro data center environment is more departmental- and individual-oriented. However, a number of developments in the next several years will stimulate this marketplace. For example:

  - The expansion of the micro-mainframe capability to encompass nearly one-third of all applications by 1989 places more management and organizational responsibility at the workstation level. Job accounting, resource management, performance monitors and other applications will be needed to enable these distributed processing systems to operate reliably and efficiently.

EXHIBIT IV-32

DATA CENTER MANAGEMENT
MICRO SOFTWARE MARKET COMPARISONS
($ Billions)



* Average Annual Growth Rate

- The technological advances in storage management to include optical storage systems will result in the need to manage, via software, this highly complex environment in a much more sophisticated way.

- The increased dependence on micros will put a premium on hardware/software reliability. Downtime/repair monitoring systems will be in high demand.

APPENDIX A: DEFINITIONS

APPENDIX A: DEFINITIONS

- INFORMATION SERVICES--Computer-related services involving one or more of the following:

  - Processing of computer-based applications using vendor computers (called "processing services").

  - Services that assist users in performing functions on their own computers or vendor computers (called "software products" and/or "professional services").

  - Services that utilize a combination of hardware and software, integrated into a total system (called "turnkey systems").

A. USER EXPENDITURES

- All user expenditures reported are "available" (i.e., noncaptive, as defined below).

- NONCAPTIVE INFORMATION SERVICES USER EXPENDITURES - Expenditures paid for information services provided by a vendor that is not part of the same parent corporation as the user.

- CAPTIVE INFORMATION SERVICES USER EXPENDITURES - Expenditures received from users who are part of the same parent corporation as the vendor.

B. DELIVERY MODES

- PROCESSING SERVICES - This category includes remote computing services, batch services, processing facilities management, and value-added networks (VANs).

  - REMOTE COMPUTING SERVICES (RCS) - Providing computer processing to a user by means of terminal(s) at the user's site(s) connected by a data communications network to the vendor's central computer. There are five submodes of RCS, including:

    . Interactive - Characterized by the interaction of the user with the system, for the purpose of problem-solving, data entry, and/or transaction processing. The user is on-line to the program/files. Computer response is usually measured in seconds or fractions of a second.

    . Remote Batch - A service in which the user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resource requirements. Computer response is usually measured in minutes or hours.

    . Data Base - Characterized by the retrieval and processing of information from a vendor-provided data base. The data base may be owned by the vendor or a third party.

- User Site Hardware Services (USHS) - Offerings provided by RCS vendors that place programmable hardware on the user's site (rather than in the vendor's computer center). USHS offers access to a communications network, access through the network to the RCS vendor's larger computers, and significant software as part of the service.

- BATCH SERVICES - This includes computer processing performed at vendors' sites of user programs and/or data that are physically transported (as opposed to electronically by telecommunication media) to and/or from those sites. Data entry and data output services, such as keypunching and computer output microfilm processing, are also included. Batch services include those expenditures by users who take their data to a vendor site that has a terminal connected to a remote computer for the actual processing.

- PROCESSING FACILITIES MANAGEMENT (PFM) (also referred to as "resource management" or "systems management") - The management of all or a major part of a user's data processing functions under a long-term contract (more than one year). This would include both remote computing and batch services. To qualify as PFM, the contractor must directly plan, control, operate, and own the facility provided to the user, either on-site, through communications lines, or in a mixed mode.

- VALUE-ADDED NETWORKS (VANs) - VANs typically involve common carrier network transmission facilities that are augmented with computerized switching. These networks have become associated with packet-switching technology because the public VANs that have received the most attention (e.g., Telenet and TYMNET) employ packet-switching techniques. However, other added data service features such as store-and-forward message switching, terminal interfacing, error detection and correction, and host computer interfacing are of equal importance.

- Processing services are further differentiated as follows:

  . Cross-industry services involve the processing of applications that are targeted to specific user departments (e.g., finance, personnel, sales) but that cut across industry lines. Most general ledger, accounts receivable, payroll, and personnel applications fall into this category. Cross-industry data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are included in this category. General-purpose tools such as financial planning systems, linear regression packages, and other statistical routines are also included. However, when the application, tool, or data base is designed for specific industry use, then the service is industry-specific (see below).

  . Industry-specific services provide processing for particular functions or problems unique to an industry or industry group. Specialty applications can be either business or scientific in orientation. Industry-specific data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are also included under this category. Examples of industry specialty applications are seismic data processing, numerically controlled machine tool software development, and demand deposit accounting.

  . Utility services are those for which the vendor provides access to a computer and/or communications network with basic software that enables users to develop and/or process their own systems. These basic tools often include terminal-handling software, sorts, language compilers, data base management systems, information retrieval software, scientific library routines, and other systems software.

- SOFTWARE PRODUCTS - This category includes users' purchases of applications and/or systems software that is sold by vendors as standard products intended for use by different organizations. Included as user expenditures are lease and purchase expenditures, as well as fees for work performed by the vendor to implement and maintain the package (when such fees are either bundled as part of the product price or offered on an annual subscription basis). Fees for work related to education, consulting, and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself. There are several subcategories of software products, including:

  - APPLICATIONS SOFTWARE PRODUCTS - Software that performs a specific function directly related to solving a business or organizational need. Applications software provides information directly for use by the end user. Applications software products classifications are:

    . Cross-Industry Products - Used in multiple user industry sectors. Examples are payroll, inventory control, and financial planning.

    . Industry-Specific Products - Used in a specific industry sector such as banking and finance, transportation, or discrete manufacturing. Examples are demand deposit accounting, airline scheduling, and materials resource planning.

  - SYSTEMS SOFTWARE PRODUCTS - Software that enables the computer/communications system to perform basic functions, which are interim steps to providing the end user with "answers" sought. Systems software product classifications are:

    . Systems Control Products - These products function during applications program execution to manage the computer system

resource. Examples include operating systems, communication monitors, and emulators.

- Data Center Management Products - These products are used by operations personnel to manage the computer system resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, and utilities.

- Application Development Products - These products are used to prepare applications for execution by assisting in design, programming, testing, and related functions. Examples include languages, sorts, productivity aids, data dictionaries, data base management systems, report writers, and retrieval systems.

- PROFESSIONAL SERVICES - This category is made up of services in the following categories:

  - SOFTWARE DEVELOPMENT - This service develops a software system on a custom basis. It includes one or more of the following: user requirements, system design, contract, and programming.

  - EDUCATION AND TRAINING SERVICES - These services help people acquire new skills, techniques or knowledge related to computers. This definition does not include services to educational institutions. (This latter market is included in the education (industry-specific) segment.)

  - CONSULTING SERVICES - Consultants advise clients on computer-related issues that are usually management oriented. Feasibility studies and computer audits are examples of services provided.

  - PROFESSIONAL SERVICES FACILITIES MANAGEMENT (PSFM) - This is counterpart to processing facilities management, except that in this

case the computers are owned by the client, not the vendor; the vendor provides human resources to operate and manage the client facility.

- TURNKEY SYSTEMS (also known as Integrated Systems) - A turnkey system is an integration of systems and applications software with hardware, packaged as a single entity. The value added by the vendor is primarily in the software. Most CAD/CAM systems and many small business systems are turnkey systems. This does not include specialized hardware systems such as word processors, cash registers, or process control systems. Nor does it include Embedded Computer Resources for military applications. Turnkey systems are available either as custom or packaged systems.

  - Turnkey systems revenue is divided into two categories.

    - Industry-Specific systems--that is, systems that serve a specific function for a given industry sector such as automobile dealer parts inventory, CAD/CAM systems, or discrete manufacturing control systems.

    - Cross-Industry systems- that is, systems that provide a specific function that is applicable to a wide range of industry sectors such as financial planning systems, payroll systems, or personnel management systems.

  - Revenue includes hardware, software, and support functions.

- SYSTEMS INTEGRATION - Services associated with systems design, integration of computing components, installation and acceptance of computer/communication systems. Systems integration can include one or more of the major information services delivery modes--professional services, turnkey systems and software products. System components may be furnished by separate vendors (not as an integrated system by one vendor, called the prime contractor); services may be furnished by a vendor or by a not-for-profit

organization. Integration services may be provided with related engineering activities, such as SE&I (Systems Engineering and Integration) or SETA (Systems Engineering and Technical Assistance).

C. HARDWARE/HARDWARE SYSTEMS

- HARDWARE - Includes all computer communications equipment that can be separatedly acquired, with or without installation by the vendor, and not acquired as part of a system.

  - PERIPHERALS - Includes all input, output, communications, and storage devices, other than main memory, that can be locally connected to the main processor and generally cannot be included in other categories, such as terminals.

  - INPUT DEVICES - Includes keyboards, numeric pads, card records, bar-code readers, lightpens and trackballs, tape readers, position and motion sensors, and A-to-D (analog-to-dialog) converters.

  - OUTPUT DEVICES - Includes printers, CRTs, projection television screens, microfilm processors, digital graphics, and plotters.

  - COMMUNICATION DEVICES - Modems, encryption equipment, special interfaces, and error control.

  - STORAGE DEVICES - Includes magnetic tape (real, cartridge, and cassette), floppy and hard disks, solid state (integrated circuits), and bubble and optical memories.

- TERMINALS - There are three types of terminals:

  - USER PROGRAMMABLE (also called "intelligent terminals"):

    . Single-station or standalone.

    . Multistation-shared processor.

    . Teleprinter.

    . Remote batch.

  - USER NONPROGRAMMABLE:

    . Single-station.

    . Multistation-shared processor.

    . Teleprinter.

  - LIMITED FUNCTION - Originally developed for specific needs, such as POS (point of sale), inventory data collection, controlled access, etc.

- HARDWARE SYSTEMS - Includes all processors, from microcomputers to super (scientific) computers. Hardware systems require type- or model-unique operating software to be functional, but the category excludes applications software and peripheral devices, other than main memory and processor or CPUs not provided as part of an integrated (turnkey) system.

  - MICROCOMPUTER (or personal computer or PC) - Combines all of the CPU, memory, and peripheral functions of an 8- or 16-bit computer on a chip, in the form of:

- Integrated circuit package.

- Plug-in board with more memory and peripheral circuits.

- Console--including keyboard and interfacing connectors.

- Personal computer with at least one external storage device directly addressable by CPU.

- MINICOMPUTER - Usually a 12-, 16- or 32-bit computer, which may be provided with limited applications software and support, and may represent a portion of a complete large system.

  - Personal business computer.

  - Small laboratory computer.

  - Nodal computer in a distributed data network, remote data collection network, connected to remote microcomputers.

- MAINFRAME - Typically a 32- or 64-bit computer, with extensive applications software and a number of peripherals in standalone or multiple CPU configurations for business (administrative, personnel, and logistics) applications, also called a General-Purpose Computer.

  - Large computer mainframes are presently centered around storage controllers but likely to become bus-oriented and to consist of multiple processors (CPUs) or parallel processors; they are intended for structured mathematical and signal processing, and are generally used with general-purpose von-Newmann-type processors for system control.

- Supercomputer mainframes are high-powered processors with numerical processing throughout that is significantly greater than the largest general-purpose computers, with capacities in the 10-50 MFLOPS (million floating point operations per second) range, in two categories:

- REAL TIME - Generally used for signal processing.

- NONREAL TIME - For scientific use, with maximum burst-mode (but sustained speed) capacities of up to 100 MFLOPS, in one of three configurations:

  - Parallel processors.

  - Pipeline processors.

  - Vector processors.

- Newer supercomputers--with burst modes approaching 300 MFLOPS, main storage size up to 10 million words, and on-line storage in the one-to-three gigabyte class--are also becoming more common.

- EMBEDDED COMPUTER - Dedicated computer system designed and implemented as an integral part of a weapon or weapon system, or platform, that is critical to a military or intelligence mission, such as command and control, cryptological activities, or intelligence activities. Characterized by MIL SPEC (military specification) appearance and operation, limited but reprogrammable applications software, and permanent or semipermanent interfaces. May vary in capacity from microcomputers to parallel-processor computer systems. Information services forecasts in this report do not include applications for this type of computer.

D. TELECOMMUNICATIONS

- NETWORKS - Interconnection services between computing resources. Provided on a leased basis by a vendor, to move data and/or textual information from one or more locations to one or more locations.

  - COMMON CARRIER NETWORK (CCN) - Provided via conventional voice-grade circuits and through regular switching facilities (dial-up calling) with leased or user-owned modems (to convert digital information to voice-grade tones) for transfer rates between 150 and 1,200 baud.

  - VALUE-ADDED NETWORK (VAN) - (See listing under Section B, Delivery Modes.)

  - LOCAL-AREA NETWORK (LAN) - Restricted limited-access network between computing resources in a relatively small (but not necessarily contiguous) area, such as a building, complex of buildings, or buildings distributed within a metropolitan area. One of the two types:

    . BASEBAND - Voice bandwidth at voice frequencies (same as telephone, teletype system) limited to a single sender at any given moment and limited to speeds of 75 to 1,200 baud, in serial mode.

    . BROADBAND - Employs multiplexing techniques to increase carrier frequency between terminals, to provide:

      - Multiple (simultaneous) channels via FDM (Frequency Division Multiplexing).

- Multiple (time-sequenced) channels via TDM (Time Division Multiplexing).

- High-speed data transfer rate via parallel mode at rates of up to 96,000 baud (or higher, depending on media).

- TRANSMISSION MEDIA - Varies with the supplier (vendor) and with the distribution of the network and its access mode to the individual computing resource location.

  - MODE - may be either:

    . ANALOG - Typified by the predominantly voice-grade network of AT&T's DDD (Direct Distance Dialing) and by operating telephone company distribution systems.

    . DIGITAL - Where voice, data, and/or text are digitized into a binary stream.

  - MEDIA varies with distance, availability, and connectivity:

    . WIRE - Varies from earlier single-line teletype networks, to two-wire standard telephone (twisted pair) and balanced line, to four-wire full-duplex balanced lines.

    . CARRIER - Multiplexed signals on two-wire and four-wire networks to increase capacity by FDM.

    . COAXIAL CABLE - HF (High Frequency) and VHF (Very High Frequency), single frequency, or carrier-based system that requires frequent reamplification (repeaters) to carry the signal any distance.

- MICROWAVE - UFH (Ultra High Frequency) multichannel, point-to-point, repeated radio transmission, also capable of wide frequency channels.

- OPTICAL FIBER - Local signal distribution systems employed in limited areas, using light-transmitting glass fibers, and using TDM for multichannel applications.

- SATELLITES - Synchronous earth-orbiting systems that provide point-to-point, two-way service over significant distances without intermediate amplification (repeaters), but requiring suitable groundstation facilities for up- and down-link operation.

- CELLULAR RADIO - Network of fixed, low-powered two-way radios that are linked by a computer system to track mobile phone/data set units; each radio serves a small area called a cell. The computer switches service connection to the mobile unit from cell to cell as the unit moves among the cells.

E. OTHER CONSIDERATIONS

- When questions arise about the proper place to count certain user expenditures, INPUT addresses them from the user viewpoint. Expenditures are then categorized according to what users perceive they are buying.

- The standard industrial classification (SIC) codes are used to define the economic activity contained in generic sectors such as process manufacturing, insurance, or transportation.

- The specific industries (and their SIC codes) included under these generic industry sectors are detailed in Exhibit A-1.

EXHIBIT A-1

INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Discrete Manufacturing	23	Apparel
	25	Furniture
	27	Printing
	31	Leather
	34	Metal
	35	Machinery
	36	Electronics
	37	Transportation
	38	Scientific and Control Instruments
	39	Miscellaneous Manufacturing
Process Manufacturing	10	Metal Mining
	11	Anthracite Mining
	12	Coal Mining
	13	Oil and Gas Extraction
	14	Mining/Quarrying of Non-Metallic Minerals, except Fuels
	20	Food Products
	21	Tobacco
	22	Textile Products
	24	Lumber and Wood Products
	26	Paper Products
	28	Chemicals
	29	Petroleum
	30	Rubber and Plastics
	32	Stone, Glass, Clay
	33	Primary Metals

Continued

EXHIBIT A-1 (Cont.)

INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Transportation	40	Railroads
	41	Local Transit
	42	Motor Freight
	43	U.S. Postal Service
	44	Water Transportation
	45	Air
	46	Pipelines
	47	Transportation Services
Utilities	49	Electric, Gas, and Sanitary
Telecommunications	48	Communications
Wholesale Distribution	50	Durable Goods
	51	Nondurable Goods
Retail Distribution	52	Building Materials, Hardware
	53	General Merchandise
	54	Food
	55	Automotive and Gas Stations
	56	Apparel
	57	Furniture
	58	Eating and Drinking
	59	Miscellaneous Retail

Continued

EXHIBIT A-1 (Cont.)

INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Banking and Finance	60	Banks
	61	Credit Agencies
	62	Security and Commodity Brokers
	67	Holding and Investment Offices
Insurance	63	Insurance (Life, Health, Etc.)
	64	Insurance Agents
Medical	80	Health Services
Education	82	Educational Services
Services	73	Business Services (excluding information services companies themselves)
	89	Miscellaneous Services
Federal Government	N/A	As Appropriate
State and Local Government	N/A	As Appropriate

Continued

EXHIBIT A-1 (Cont.)

INDUSTRY SECTOR DEFINITIONS

INDUSTRY SECTOR	INDUSTRY SIC	INDUSTRY NAME
Other Industries	01-09	Agriculture, Forestry, and Fishing
	15-17	Construction
	65	Real Estate
	66	Combinations of Real Estate, Insurance, Loans, Law Offices
	70	Hotels, Rooming Houses, Camps, and Other Lodging Places
	72	Personal Services
	75	Automotive Repair, Services, and Garages
	76	Miscellaneous Repair Services
	78	Motion Pictures
	79	Amusement and Recreation Services, Except Motion Pictures
	81	Legal Services
	83	Social Services
	84	Museums, Art Galleries, Botanical and Zoological Gardens
	86	Membership Organizations

APPENDIX B: FORECAST DATA BASE

EXHIBIT B-1

MICROCOMPUTER APPLICATION SOFTWARE PRODUCTS MARKETS BY MARKET SEGMENT, 1984-1989

	($M) 1983	83-84 GROWTH	($M) 1984	($M) 1985	($M) 1986	($M) 1987	($M) 1988	($M) 1989	84-89 AAGR
INDUSTRY-SPECIFIC SEGMENTS									
DISCRETE MANUFACTURING	25	50%	38	56	83	121	177	257	47%
PROCESS MANUFACTURING	7	60%	12	18	27	39	58	88	50%
TRANSPORTATION	4	104%	9	14	23	34	52	79	56%
DISTRIBUTION	28	62%	46	70	104	151	216	312	47%
BANKING AND FINANCE	40	100%	80	120	180	270	405	600	50%
INSURANCE	24	50%	36	54	76	105	141	191	39%
MEDICAL	14	72%	24	38	60	86	123	176	50%
EDUCATION	15	40%	21	28	36	47	62	80	31%
SERVICES	5	83%	10	15	23	35	51	74	50%
OTHER INDUSTRY-SPECIFIC	5	83%	10	17	26	40	59	83	56%
SUB-TOTAL *	174	68%	293	443	656	953	1380	1998	47%
CROSS-INDUSTRY SEGMENTS									
PLANNING AND ANALYSIS	194	73%	334	520	745	1034	1412	1940	42%
ACCOUNTING	110	57%	172	258	373	524	736	1098	45%
HUMAN RESOURCES	25	36%	34	46	58	73	92	118	28%
ENGINEERING/SCIENTIFIC	18	44%	26	35	49	68	93	129	38%
EDUCATION/TRAINING	22	70%	38	62	97	152	233	362	57%
OTHER CROSS-INDUSTRY	118	37%	162	213	274	346	439	559	28%
SUB-TOTAL	487	57%	765	1133	1595	2197	3026	4207	41%
GRAND TOTAL	661	60%	1058	1576	2251	3150	4406	6206	42%

* Sub-total includes Utilities, Telecommunications, Federal Government, and State and Local Government.

EXHIBIT B-2

MICROCOMPUTER SYSTEMS SOFTWARE PRODUCTS MARKETS BY SOFTWARE TYPE, 1984-1989

	($M) 1983	83-84 GROWTH	($M) 1984	($M) 1985	($M) 1986	($M) 1987	($M) 1988	($M) 1989	84-89 AAGR
MARKET SEGMENT									
SYSTEMS SOFTWARE									
APPLICATION DEVELOPMENT TOOLS	148	95%	289	509	851	1351	2063	3029	60%
SYSTEMS CONTROL	161	61%	260	377	516	662	803	909	28%
DATA CENTER MANAGEMENT	22	86%	41	71	116	180	270	389	57%
TOTAL SYSTEMS SOFTWARE	331	78%	590	956	1482	2193	3136	4327	49%
GRAND TOTAL - ALL MICROCOMPUTER SOFTWARE	992	66%	1648	2532	3733	5343	7542	10533	45%

EXHIBIT B-3

MICROCOMPUTER SOFTWARE PRODUCTS MARKETS BY MODE, 1984-1989

	($M) 1983	83-84 GROWTH	($M) 1984	($M) 1985	($M) 1986	($M) 1987	($M) 1988	($M) 1989	84-89 AAGR
APPLICATION SOFTWARE									
INDUSTRY-SPECIFIC	174	68%	293	443	696	953	1380	1998	47%
CROSS-INDUSTRY	487	57%	765	1133	1595	2197	3026	4207	41%
SUB - TOTAL APPLICATION SOFTWARE	661	60%	1058	1576	2251	3150	4406	6206	42%
SYSTEMS SOFTWARE	331	78%	590	956	1482	2193	3136	4327	49%
TOTAL SOFTWARE INDUSTRY - SPECIFIC	174	68%	293	443	656	953	1380	1998	47%
CROSS - INDUSTRY INCLUDING SYSTEMS SOFTWARE	818	66%	1355	2089	3077	4390	6162	8534	44%
GRAND TOTAL	992	66%	1648	2532	3733	5343	7542	10533	45%

APPENDIX C: RELATED INPUT REPORTS

APPENDIX C: RELATED INPUT REPORTS

A. 1984 REPORTS

1. INDUSTRY ANALYSES REPORTS

- U.S. Information Services Cross-Industry Markets, 1984-1989
- U.S. Information Services Vertical Markets, 1984-1989
- U.S. Software Products and Professional Services Markets, 1984-1989
- U.S. Processing Services and Turnkey Systems Markets, 1984-1989
- Eighteenth Annual ADAPSO Survey of the Computer Services Industry - 1984

2. MARKETS AND ISSUES REPORTS

- Annual Information Systems Planning Report, 1984
- Decision Support Systems and Beyond
- End-User Micro-Mainframe Needs
- End-User Software Needs and Requirements
- Executive Workstation Acceptance
- Impact of New Software Productivity Techniques
- Impacts and Challenges of Decision Support Systems (DSS)
- Integrated DBMS-Applications Software
- Integrated Software Systems: Experiences and Outlook
- LAN/CBX Tradional Communications: Which Approach?
- Local Area Networks: Directions and Opportunities

- Market Impacts of IBM Software Strategies
- Market Opportunities for Applications Transfer to Personal Computers
- Micro-to-Mainframe: Telecommunications
- New Opportunities for Software Productivity Improvements
- New Trends and Opportunities in Fourth Generation Languages
- Office Systems Annual Planning Report
- Office Systems Implementation: Approaches That Work
- Organizing End-User Departments for Information Systems
- Organizing the IS Department for End-User Computing
- Personal-Computer-to-Mainframe Market Opportunities
- Pricing and Distribution of Personal Computer Software
- Protecting the Corporate Software Investment
- SNA Networks: Challenges and Opportunities
- Software and Services for the Home Computer
- Software Annual Planning Report
- Supporting Personal Computer Software Profitably
- Systems versus Services for Small Organizations: New Decision Criteria
- Techniques for Training and Supporting End Users
- Telecommunications Annual Planning Report
- Telecommunications Interfaces for the Mid-1980s
- Update on Information Centers: Value and Future Directions

B. 1982-1983 REPORTS

- Application and Use of Personal Computers in Offices
- End-User Experiences with Fourth Generation Languages
- Personal Computer Opportunities for RCS Vendors
- Personal Computer Software Market Opportunities
- Relational Data Base Management Developments

C. INPUT SUBSCRIPTION PROGRAMS

- Company Analysis and Monitoring Program (CAMP) for the Information Services Industry
- Customer Service Program (FSP)
- Information Systems Planning (ISP)
- Federal Information Systems and Services Program (FISSP)
- Market Analysis and Planning Service (MAPS)